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SCIENCE & TECHNOLOGY

SELECTED ARTICLES ON

COMPUTER TECHNOLOGY

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SELECTED ARTICLES ON COMPUTER TECHNOLOGY

Analog Digital Technology Systems

Prague VYBER INFORMACI Z ORGANIZACNI A VYPOCETNI TECHNIKY in Czech No 2, 1983 pp 189-195

[Article by Moroslav Kepka, Automation and Computer Technology Enterprises Concern: "Experience With the Introduction of ADT Systems and Examples of Their Interesting Applications in Practice"]

[Text] The objective of this article is summarily to assess the experiences gained in the introduction of ADT systems between 1973 and 1983 and to point out their contribution to the development and utilization of minicomputers not only in the sphere of ASR TP [automated systems for control of technological processes], but also in other applications, and briefly to mention some interesting applications of these systems and the limiting factors attendant to their application. The article should familiarize the technical public with the current state of the art and its outlook for the future.

1. Introduction

The current year will mark the 10th year since users in our country received the first minicomputers of the ADT 4000 and ADT 4100 series from ZPA [Industrial Automation Enterprises] in Trutnov and, 2 years later, also the type ADT 4300 from ZPA Cakovice.

The area of their originally intended application is defined by their designation. The abbreviation ADT stands for analog digital technology, and this system actually started to be developed in VUMS [Research Institute for Mathematical Machines] as a digital part of the hybrid system ADT 7000, which also included the analog part ADT 3000 researched in VUMS Prague and developed by the Aritma enterprise in Prague (in a plant that was later transferred to ZPA Cakovice).

This new hybrid system continued a tradition of many years in the development of analog technology in the CSSR and through its digital part provided our

users with an extraordinarily well-conceived minicomputer for which there was a great demand, which up to then was being met by imports, partially from nonsocialist countries (mainly the HP 2116 type) and partially from the USSR (systems M 600 and M 7000). The ADT system's compatiblity with those imported systems offered a great advantage in that it became possible to follow up on the experience gained in the operation of the formerly imported systems and even to take over applicational programs (even if not always with just minor modifications).

Lack of experience and probably an endeavor to make available a low-cost and compact system led to the limitation of the extent of operational memory storage to 4-8 K words; soon after the launching or production, it had to be expanded to 16 K word capacity. Even the latter turned out later to be too small for many applications.

ADT was intended mainly for application in hybrid systems, but practical applications and demands of users turned the situation completely upside down and ADT minicomputers started to find many applications in areas entirely different from those they were originally intended for. One may well ask why that happened. At that time the world saw a tempestuous increase in the application of minicomputers for automation in the most varied areas, and the technical properties of ADT systems made them suitable and attainable for such applications in our country.

2. Initial Practical Applications

The first more extensive application of the ADT system was its use in the CIS 3000 digital information system for the large capital construction project of the Tusimice II Power Plant.

The objective of using such an extensive information system was to simplify control of the power plant's 200 MW block, which also became reflected in the simplification of the entire power plant's control room.

Information about the block's operation was concentrated in a condensed and analyzed form on the picture screen (display) with differentiation of the requisite priorities for critical and limiting states. The system constantly monitored thousands of analog and binary data and was also capable of providing a printout of this information in reverse through its built-in subprogram "postmortem" (30 minutes in reverse), which in case of breakdown or accident made it possible to perform an analysis and determine the cause of it.

The use of an information system prior to the availability of an actual automated control system turned out to be a risky yet daring step that made possible continued development on the basis of the experience thus acquired, which later materialized in the CIRIS system. These extensive information systems were then applied at other power plants in Detmarovice and Chvaletice, in the Cizkovice Cement Mill and the gas generation plant in Vresova.

The principal pioneering efforts in this area were developed by VUAP [Research Institute for Automation Systems] Prague, which compiled for these systems

basic software, including special applicational programs, and for the ADT system it selected and connected suitable peripheral equipment, including the development of demanding in puts and outputs for connection with the power plant (DASIO) which was later produced by the Metra enterprise in Blansko. Magnetic drum memories from Poland (with a capacity of 0.256 MB) were used as external memories.

In addition to these applications, ADT systems were used for scientific and technical calculations in many computer centers as well as in their original area of application--in hybrid systems.

A positive aspect of their use was that within a short time of the launching of their production there became available basic software developed by VUT [Institute of Technology] Brno (Chair for Automatic Computers) in cooperation with VUMS and VUAP Prague.

The affordable price of the systems (an average of Kcs 1.5 million) in their basic sets, little demand on air conditioning and good operational reliability requiring minimum numbers of operating personnel, forced the expansion of production by introducing parallel production in ZPA Cakovice, which commenced production of the ADT 4300 system in 1975.

3. Demands for Continued Improvements and Technical Development

The positive results obtained in initial applications and the attained level of experience provided an impetus for the continued technical development of the ADT system, for better models on the one hand and the expansion of usable peripheral systems on the other. That became reflected in improved performance (number of operations per second) as well as in the expansion of operational memory storage to 128 K words (with a mapping system of up to 1 M words) as more extensive systems showed limited capacity for using better and more complex algorithms. Full compatibility of software from bottom to top was retained, even though the operational code provided for easier performance of many operations. Practical operations confirmed that new types of ADT systems handle even old programs without requiring adaptations, and handle them three times as fast. The expansion of main memory's capacity to 2 MB proved to be a great advantage provided by these new types.

In addition, all new peripheral devices were gradually added to the ADT system providing for their great adaptability and modular construction. The improvement of basic software, both in the area of high-performance operating systems (DOS 3, DOS 4) and in the incorporation of additional translators and software for data transmission and the generation of computer networks, progressed hand in hand with the development of hardware.

Applications in the area of ASR TP generated pressure to achieve a high degree of system reliability, a fact which had positive effects on production itself and on the selection of components, creating a demand for adding cassette disk memories with a higher capacity and, later, large-capacity disk memories.

In the initial period of SMEP development the ADT system was incorporated into this international project as SMEP 1 (SMEP 1 and SMEP 2 followed up the Hewlett-Packard [HP] line of computers). However, after successfully passing the prescribed international tests in Bratislava, the Czechoslovak SM 1 system was not recommended or accepted into the uniform series by the board of head designers due to its technical design differences with the Soviet SM 1-2 system, which--in comparison to the HP system--used a special channel (2 K), while the Czechoslovak system retained its full compatibility with the HP system. Development of the system then continued as part of a national SMEP program and within the framework of projects in which ADT systems found their full application.

Preparations were made to augment the original frame version by a new modern desktop version which found positive response among users, particularly for smaller systems.

4. Factors Limiting Wider Application of ADT

Even though the emergence of ADT minicomputers in the most varied sectors of our national economy proved very successful, it later turned out that the production of peripheral equipment was underestimated, leading to a critical shortage.

Our own CSSR production was oriented only toward a perforated tape reader and a desk-type punch card reader (EC 6112). A 3 MB capacity cassette disk was developed specially for ADT (EC 5069), bearing the trademark KDP 720 in Zbrojovka Brno. However, its production was seriously limited due to its inadequate capacity, which was made up for by production fo the EC 5058 (DP 4) disks for JSEP EC 1021 systems.

Thus, in summary: we managed to produce the ADT systems, but most of their peripheral equipment had to be imported. This involved primarily the following systems: a card puncher (Poland), display unit (Hungary), small magnetic tape (Poland, Bulgaria), small line printer (Hungary), cassette disks (Bulgaria) and later also flexible disks (Hungary).

This limiting factor adversely affected both the development of ADT systems and their effective application and utilization, because the systems were at first supplied only in their basic limited configuration with the promise of being supplemented with the missing peripheral equipment later.

This critical situation lasted until 1981-82, when the production of cassette disks in Zbrojovka Brno was considerably accelerated and production of Czechoslovak type SM 7202 display units commenced in Tesla-SE (Orava), but the shortage of flexible disk units and small magnetic tapes still persists and they have to be imported from Bulgaria and Poland. It has turned out that the successful application of minicomputers calls not only for turning out a reliable processor, but also for producing the requisite peripheral systems. In the case of ADT systems application in ASR TP, a good and necessary peripheral unit was developed by VUAP--a unit for communication with the medium, DASIO 600, which is produced by Metra in Blansko. In these applications the lack of peripheral systems was not felt very strongly, because importation of

the requisite peripheries could be easily taken care of as part of capital construction.

These difficulties led to an appropriate and sensible conclusion for the remaining years of the current 5-year plan, namely to provide an adequate number of key peripheries (cassette disks, flexible disks, small magnetic tape) by domestic production, including the introduction of production of a new magnetic tape for minicomputers on the basis of its development at home by the ZVT [Computer Technology Enterprises] concern enterprise in Banska Bystrica.

There also occurred difficulties in providing hardware and software services, but these were gradually overcome.

The basic requirement placed on a minicomputer is high operational reliability of the entire system.

Due to the small number of parts in a processor, it is possible to attain the required reliability standards on the order of several thousand hours per breakdown (T_0>2000 hrs); in systemic use the main difficulties are encountered in the reliability of peripheral systems, in the case of large system mainly in their large number, without making provisions for providing spares. After all, in mechanical systems there always is given the final limit of reliability that can be overcome only by providing reserves or doubling such systems. That, however, causes another proliferation of peripheral systems that are still in short supply.

5. Interesting Areas of ADT Systems Application

To present an exhaustive outline of all applications of ADT systems today exceeds the scope of a short article. It ought to be pointed out that ADT systems are applied in the most varied areas of the national economy, from extensive systems in ASR TP for mass data processing to single-purpose simple applications in specialized measuring instruments.

Only typical and interesting applications are selected from this vast field:

1. CIS 3000--digital information system based on the ADT 4100 system with a 32 K word memory, external magnetic drum memory (imported from Poland), system for connection with object DASIO 600, special software with operating system (INFOS), computer reserve by doubling. The system was intended for acquisition and analysis of information in large investment units such as power plants, gasworks, cement mills.

Applications:

--Tusimice II, Detmarovice, Chvaletice power plants,
--Cizkovice Cement Mill,
--Vresova Gasworks,
--nuclear power plants--for integration of information from the Titan II system,
--information sytems of steel mills (HS 320--Vitkovice),
--hydroelectric power plants on the Vltava cascade.

2. CIRIS--digital and control system based on ADT 4400 (4500) with memory up to 128 to 256 KB, 5 MB cassette disks external memory, system for connection with the medium DASIO 600, a total of three processors for mutual reserve, special software.

The system is intended for the acquisition and analysis of information and simultaneous performance of control algorithms on the basis of the IRIS and KORAL systems (up to 50 control loops depending on the extent of operational memory).

Applications:

--Melnik III Power Plant,
--blast furnace No IV--Vitkovice,
--Ceska Lipa Dairy,
--Chrast Central Transformer Station near Plzen,
--subway traffic control in Prague--line B, new dispatching,
--Litex Chrastava Textile Industry--finishing machinery control.

3. ZTK--system for control of welding equipment (automated): a simple control system for welding compressor wheels and welding on rotor blades. It provides guidance for welding wire paths in technologically difficult conditions. The system is based on the ADT 4100 computer with special peripheral equipment.

Applications:

--CKD enterprise--Compressors Prague concern enterprise.

4. NS 720--digital control system for controlling machine tools: central part is formed by an ADT processor, which handles the actual control and also stores programs for individual technological operations.

5. IVU--integrated production sectors: the system's basis is formed by three ADT 4500 systems in reserve mode. Programs for individual operations of the technological line are stored centrally in the operational memory storage and are transmitted to individual machines equipped only with interpolators and V/V members. The system was built in VUOSO [Research Institute for Machine Tools and Machining].

Application:

--TOS [Machine Tool Production] Olomouc.

6. ASM TS--automated system for measuring rotary machinery: the system's basis is formed by the ADT 4500 computer with a number of digital measuring instruments and IT 10 intelligent terminals connected to the IMS 2 busbar. The system is intended for measuring the characteristics of electric motors as well as of diesel engines in testing shops. It automatically carries out all prescribed measurements at the test stand, including load characteristics.

Applications:

--CKD Traction, Moravian Electrotechnical Enterprises Mohelnice, CKD Diesel Engines Prague.

7. Mass spectrograph produced in Tesla Brno: The ADT 4500 system (formerly ADT 4100) forms the analytical part for Fourier transformation and the imaging of measurement outputs on a recorder. The system could not be made without a computer.

8. Data processing--control of textile materials storage in Unitex Brno: The system is based on the ADT 4300, which comes equipped with D 120 cassette disks (imported from nonsocialist countries) with a 10 MB capacity.

The system's role is to keep centralized records and inventory of materials (incoming and outgoing), expedite orders, keep records of stocks of material, locate required items, including the routing plan for stacking trucks in storage.

This system is so far the most complicated system for data processing based on a minicomputer. Its software was prepared by the Incotex organization in Brno on the basis of the DOS 3 operating system and the DBS 1000 data base system for ADT.

Many other examples could be found in addition to the above, particularly in laboratories and in the area of scientific and technical calculations.

6. Assessment of the Significance of ADT Systems to the National Economy

Considering that first deliveries of the ADT system started in 1973 from ZPA Trutnov (types ADT 4000 and 4100) and as of 1976 also from ZPA Cakovice (type ADT 4300), and within a short time the systems were technically innovated with considerable improvements in their performance properties (ADT 4400 and ADT 4500), this year these systems have been in production for 10 years.

The number of systems in use today already exceeds 500 units, and due to their many successful applications it is envisioned to continue their production in the current 5-year plan as well, so that production will exceed 1,000 systems. Production in the Seventh 5-Year Plan is planned at annual volumes of 100-110 units per year with a slight decrease toward the end of that 5-year plan.

Overall production is reflected in the following table:

Fifth 5-Year Plan	Sixth 5-Year Plan	Seventh 5-Year Plan
11 units	387 units	~500 units

If we estimate the average price of one system to be Kcs 2 million, the input into the national economy will represent approximately Kcs 2 billion worth of systems. However, this amount represents only the valorization of hardware, but not the effort that went into software, the value of which is for the time

being measured only by the capacity expended for its formation in so-called man-years. It is estimated that basic software alone represents a value on the order of several hundred (about 900) man-years, representing roughly a value of Kcs 630, million, and software in special application programs amounts to at least that much or, rather, twice that amount. Thus, the total means invested in software range between Kcs 1,260 million and Kcs 1,890 million, which is in keeping with worldwide experience, because the share expended on hardware and software tends to be identical (recently, expenditures for software have tended to outweigh those for hardware).

If we consider the importance of ADT systems to the national economy from this viewpoint alone, it must be stated that the means invested into this system represent several billion koruna and, as experience shows, their value will be recovered many times over, as is also shown by worldwide experience. Assuming that the systems' service life is approximately 7 years and return on investment is (on the average) 2 years, the contribution made by ADT minicomputers during the time they are in use can be estimated at approximately Kcs 10 billion, certainly not a negligible amount. From another viewpoint it must be pointed out that the production of ADT systems represented in its time a substantial anti-import measure, specifically in the critical period of 1978-81, when with the exception of the SAPI minicomputer there was no other suitable type of minicomputer available on the domestic market.

First experiences with the introduction of ASR TP were gathered prevalently with the use of ADT systems.

The system's low price expanded the area of computer technology applications even to fields into which the expensive JSEP system has not made any inroads as yet, such as laboratories, research centers, specialized operations and many other applications.

These facts are a reality that must be taken into consideration in the continued development of applications.

7. Conclusion

From what has been said it follows that ADT systems came into production at a time when there was a great demand for minicomputers, and even though their original mission was to find application in hybrid and analog systems, real need found application for them in areas entirely different from those for which they were intended and planned.

Nevertheless, they did find full application in all of those areas which provided an impetus for their innovation and expansion by adding many new peripheral systems which, however, created for their users a barrier limiting more spontaneous development in application and effective utilization. The development of our own software received full support and attention from the very start with a view to specialized applications, which became reflected very positively also on the part of users who were developing their own applicational programs. From the viewpoint of the number of applications, the number of systems produced by the end of 1985 will reach a total of approximately 1,000

units, representing a high amount of investment in the national economy, an amount that is far from negligible.

Thus, it stands to reason that we make sure that the hard-earned experience and values generated in software can be taken over in their full extent and be transferred in the future to new microcomputer systems, which will guarantee full program compatibility and warrant for their present users that the costs and effort expended on the generation of special application programs will not have been sacrificed in vain.

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New Microprocessor Systems Parts

Prague VYBER INFORMACI Z ORGANIZACNI A VYPOCETNI TECHNIKY in Czech No 2, 1983 pp 201-202

[Text] It has already been 10 years since the introduction on the world market of the first microprocessor--a highly integrated circuit (LSI) which in such a revolutionary manner affected the introduction of digital technology in all fields. Also starting to participate in this development is the Tesla concern enterprise in Roznov, which introduced into production the basic set of the first Czechoslovak MH 3000 microprocessor system intended for applications with high demands on speed. It involves the following circuits:

MH 3001--control circuit for microprogram,
MH 3002--central processor circuit,
MH 3003--circuit for acceleration of transmission,
MH 3205--fast binary decoder 1 of 8,
MH 3212--8-bit accumulator,
MH 3214--control circuit for priority interruption,
MH 3216--4-bit two-way noninverting busbar exciter/receiver.

Peripheral circuits of the MH 3000 system are simultaneously used as auxiliary circuits for the unipolar MHB 8080 system now under development that will be produced by Tesla Piestany. To complete the basic set of the unipolar MHB 8080 system, Tesla Roznov is developing two additional bipolar circuits which will be in production in 1983. They are the MH 8224 time pulse generator and CPU exciter, and the MH 8228 systemic control circuit.

In accordance with the intergovernmental agreement with the USSR on software and hardware compatibility of microprocessor circuits, subsequent developmental efforts will be oriented toward the joint design of circuits for the 16-bit 8086 microprocessor system. Its central unit is being developed by HMOS technology in the USSR, bipolar circuits in the CSSR. They involve the following types:

MH 8282--eightfold noninverting accumulator,
MH 8283--eightfold inverting accumulator,
MH 8286--eightfold noninverting busbar transceiver,
MH 8287--eightfold inverting busbar transceiver.

The entire microprocessor system is to become available in 1985. Microcomputer design makes it imperative to supplement microprocessors by some additional circuits, of key importance among them semiconductor memories. Memories MH 7489 with 64 bit capacity and MH 74 S 201 with 256 bit capacity are gradually being introduced into production in accordance with the plan for long-term development. Also ready to be introduced into production is the MH 82 S 11 RAM memory with 1 K bit capacity. Available among PROM memories are the types MH 7488 (256 bits) and MH 74 S 287 (1 K bits), readied for production is the MH 74 S 571 (2 K bits), and under development is the programmable logic field FPLA 8 x 16 x 48 bits. Additional programmable memories with 4 K and 8 K bit capacity, respectively, are readied for production in 1985 (isopolar technology). Tesla Piestany produces at the same time a 16 K bit memory in unipolar technology.

Coming to the fore in computer technology used in the control of technological processes and in other allied fields is the importance of digital-analog and analog-digital converters. While a prevalent part of physical quantities and technological processes become manifested contiguously, i.e., in analog fashion, modern technical devices which monitor and control these processes operate on the digital principle. That is why microcomputers are provided with circuits for A/D and D/A data conversion. The set of circuits for such converters follows a two-stage design. In the first stage are developed circuits required for 8-bit converters, in the second stage those for 12-bit converters. The entire set will become available by the end of the Seventh 5-Year Plan in the following composition:

--monolithic 8-bit D/A converter,
--monolithic 12-bit D/A converter,
--8- and 12-bit approximating registers,
--precision voltage reference + 10 V,
--precise and fast voltage comparators,
--precision operational amplifiers,
--sampling amplifiers,
--analog multiplexes.

M3T 300 Programmable Terminal

Prague VYBER INFORMACI Z ORGANIZACNI A VYPOCETNI TECHNIKY in Czech No 2, 1983 pp 203-207

[Text] The M3T 300 programmable terminal is produced by the Metra concern enterprise in Blansko. It was developed in cooperation with VUMS [Research Institute for Mathematical Machines] in Prague and has been marketed through the Office Machines fiduciary concern enterprise since the latter half of 1982. It is a modern desktop computer device that can be used for:

--medium-size scientific and technical calculations,
--acquisition, processing and long-distance transmission of medium volumes of data,
--control and automation of technological processes and measurements,
--programmer training,
--application in various industrial sectors.

Basic Unit of the M3T 300.X Terminal

The key parts of the basic unit are a microprogram-controlled processor, working memory, display unit, keyboard and a magnetic card memory. The ferritic working memory has a basic capacity of 8 K 16-bit words and can be expanded by semiconductor blocks of 4 K words capacity to 24 or 28 K words. In the ferritic part of the memory is a fixed section with stored programs for operation of input/output units. The screen capacity of the alphanumeric display unit is 256 ASCII code characters, i.e., 8 lines with 32 characters each. The contactless keyboard is formed by blocks of alphanumeric, digital and functional keys. Substitutable cards with inscriptions denote the programmable functions of functional keys. The magnetic card memory facilitates recording and reading of the PMC-05 (150 x 58 mm) magnetic cards with a capacity of 2 x 512 words. Another part of the basic unit is a 16-bit indication panel displaying by means of luminescent diodes the contents of registers and memories.

External peripheral units can be connected by means of exchangeable adapters. The M3T 300.X basic unit accommodates a total of three adapters. The number of adapters can be increased to 15 by means of an expander. Connection with peripheral units can be done through two types of channels:

--slow (program controlled),
--fast with direct access into working memory (DMA).

The basic unit makes it possible to operate with interruptions of the program routine.

The basic unit of the terminal is produced in the following variants:

M3T 300.1--with working memory of total capacity of 24 K words and a control unit for long-distance data transmission facilitating synchronous transmission at speeds up to 19,200 bits/s with BSC transmission routine along a telecommunication link with signal converters with interface conforming to CCITT V.24/V.28;

M3T 300.2--with working memory of total capacity of 28 K words without control unit for long-distance data transmission, which in case of need can be provided by an independent adapter.

The basic unit with three built-in exchangeable adapters forms a compact unit for desktop use together with other connected external peripheral units. The expanded design version M3T 310, including the basic unit of the M3T 300.X terminal, makes it possible to build into and connect to the terminal desk additional adapters up to a total of 15 adapters and offers the possibility for building in and connecting two or four flexible magnetic disk units.

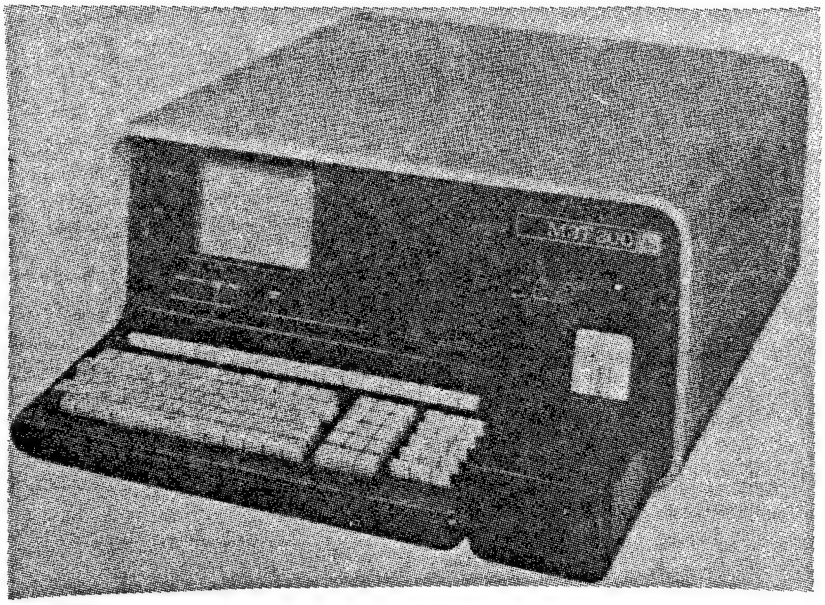

Figure 1. Basic Unit of the M3T 300 Programmable Terminal

M3T 303.X Exchangeable Adapters

M3T 303.1--for connecting the FS 751 A/M or FS 1503 perforated tape reader, the DT 105 S perforated tape puncher or Robotron 1215;

M3T 303.2--for connecting the Consul 2111 or DZM 180 mosaic printer;

M3T 303.4--for connecting the M3T 312 external memory with flexible disks;

M3T 303.5--adapter with IMS 2 busbar (IEEE 488) for connecting measuring instruments;

M3T 303.9--adapter for synchronous or asynchronous data transmission, maximum transmission speed 2,400 bits/s, interface CCITT V.24 or IRPS;

M3T 303.11--time generator, timer.

In addition to these adapters, the serial production of which is commencing, Metra is developing yet other adapters, e.g., for connecting the interface unit with DASIO medium, etc.

Software

The basic systemic program is permanently stored in the read-only section of working memory. Contact between peripheral units and the user program occurs through SIO (system input-output) service programs.

User software is divided into basic, supplied with each system, and supplementary, the supplying of which depends on the configuration of the system and on the extent of user applications.

Basic software includes translators for the following programming languages:

--ASSEMBLER, which is compatible with the language used with ADT or HP minicomputers;

--BASIC, which is suitable for scientific and technical calculations and other applications.

Supplementary software of the system includes:

--ATS (automatic test system) BASIC, facilitating the conversational configuration of user programs, control of measuring instruments and interface units;

--service program for BSC procedure of long-distance data transmission;

--the all-purpose KOKUO conversion program for local and long-distance data conversion;

--the BCS (basic control system) perforated tape operating system analogous to the BCS operating system of ADT minicomputers, facilitating operation with relational programs and containing translators for ASSEMBLER, FORTRAN II and ALGOL 60 languages;

--the FDOS disk operating system with translators of ASSEMBLER, ATS BASIC languages and the KOKUO conversion communication program.

Basic software comes in magnetic card and perforated tape versions, supplementary software, depending on type, on perforated tape, magnetic cards or flexible magnetic disks.

User documentation for the system includes a description of the system, operating instructions and software manuals.

Potential for Long-Distance Data Transmission

The employed BSC (binary synchronous communication) transmission procedure facilitates long-distance transmission of data between two M3T 300 systems or between the M3T 300 and hierarchically higher JSEP, IBM, ADT or Hewlett-Packard computers. These hierarchically higher computers must have the requisite equipment for long-distance data transmission, both with regard to hardware (data transmission multiplex or communication processor in JSEP or IBM, e.g., a communication module in case of the SC 1025, the TC 104 or TC 110 communication adapter in case of the ADT 4500) and with regard to software (telecommunication access methods for JSEP or IBM, e.g., BTAM, service programs for communication adapters for ADT minicomputers, application programs including potential for transmission of data sets, etc.).

Long-distance data transmission between two M3T 300 systems facilitates a simple and effective exchange of data sets and long-distance dialogue between operators without dependence on a hierarchically higher computer processing system.

Transmission occurs at the selected transmission speed in blocks with maximum length of 256 characters protected against transmission errors by block parity or a 16-bit cyclic polynomial according to CCITT or IBM. The used decision-making feedback then provides for automatic repetition of a corrected block. The telecommunication link can be either telephone type, terminated by modems (e.g., Czechoslovak MDS 1200 modems), or galvanic type with GDN signal converters. The employed signal converters must be equipped with a time base generator.

Thus, the potential of the M3T 300 system for communications makes it possible to establish linkages in territorially extensive automated control systems and to incorporate the system into systems using hierarchically higher computers.

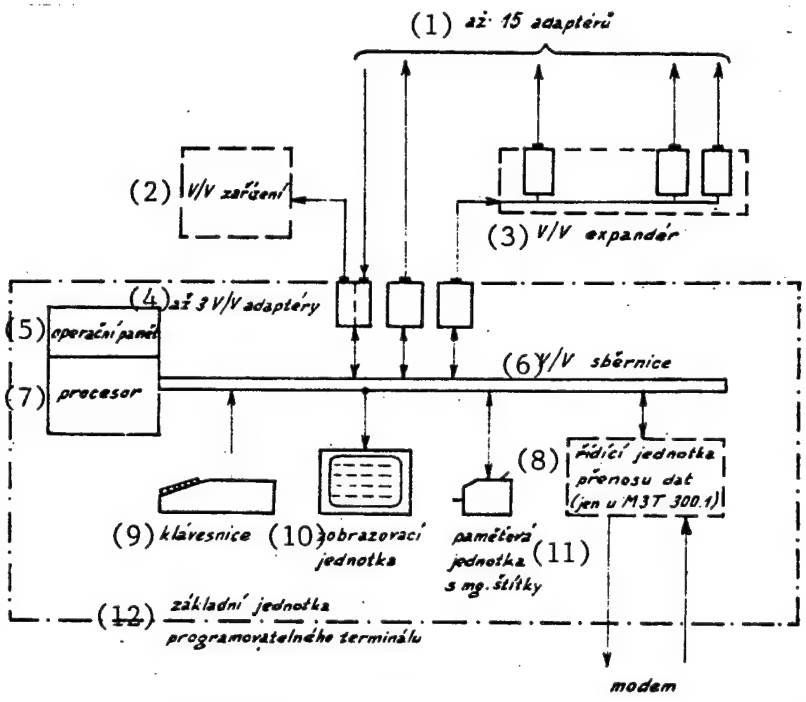

Figure 2. Block Arrangement of the M3T 300 Programmable Terminal

Key:

(1) up to 15 adapters
(2) V/V system
(3) V/V expander
(4) up to three V/V adapters
(5) working memory
(6) V/V busbar
(7) processor
(8) data transmission control unit (only in M3T 300.1)
(9) keyboard
(10) display unit
(11) memory unit with magnetic cards
(12) basic unit of the programmable terminal

Conclusion

The M3T 300 programmable terminal represents a system that has been missing on the Czechoslovak market up to now. It fills the gap between simple processors and nonprogrammable terminals on the one hand and between all-purpose ADT and SMEP minicomputers and JSEP computers on the other hand. Thanks to its modest space, power input, work environment and operation requirements, and thanks to its potential for communication and calculation, it will find application in many organizations directly at specific work stations, which will bring computer technology to where it is most needed.

The M3T 300 system is marketed and serviced on CSR territory by the Office Machines fiduciary concern enterprise in Brno.

USSR Technical Literature Selections

Prague VYBER INFORMACI Z ORGANIZACNI A VYPOCETNI TECHNIKY in Czech No 2, 1983 pp 254-255

[Text] Fleyshman, B.S., "Osnovy sistemologii" (Basics of Systemology). Radio i svyaz, Moscow 1982, 368 pp, 38 ill., price Kcs 32.

The author is a worldwide noted specialist in system engineering and publishes in this volume his original studies. He deals with conceptual and mathematical principles of the theory of complex systems from the viewpoint of systemology. He subjects all studies in this field published worldwide to critical assessment in this publication. He emphasizes the importance of computer technology in dealing with problems of system engineering.

Yusupov, I. Yu., "Avtomatizirovannye sistemy prinyatiya resheniy" (Automated Decisionmaking Systems). Nauka, Moscow 1983, 140 pp, 19 ill., 5 tables, price R 1.20.

The author provides a detailed outline of theories and practical methods for planning ASR [Automated Control Systems] and ASR TP [Automated Systems for Control of Technological Processes] in industrial enterprises. He proposes an optimum procedural methodology for dealing with planning programs in the devising of ASR. He envisions the utilization of JSEP [Uniform System of Electronic Computers] and SMEP [System of Small Electronic Computers] computers. The presentation is characterized by an original approach to the problem and its ultimate objective of achieving an optimum variant of ASRP [Automated System for Management of Enterprises] and ASRTP.

Pirogov, V.V. and L.P. Svirskiy, "Raspredelenie sistemy modelirovaniya" (Classification of Modeling Systems). Znanie Latvian SSR 1983, 126 pp, 54 ill., 13 tables, price R 1.30.

This publication in monograph form offers an integrated outline of the current state of the art in methods for JSEP computer-aided modeling systems. It provides a detailed specification of the logic structure of individual modeling systems. It cites successful practical examples from modeling. It pays particular attention to ASR with the possibility of conducting direct dialogue between operator and computer even from remote terminals.

Gabasov, P.I. and F.M. Kirillova, "Konstruktivnye metody optimalizatsii" (Devising Optimization Methods). Minsk University 1983, 960 pp, 86 ill., 67 tables. Five volumes to be published by late 1983. Price R 12.

The first volume publishes linear methods for devising optimal programs. Particular attention is devoted to linear programming of large dimensions. The second volume will deal with the optimization of control, particularly in the flow of information by means of the JSEP 2 computer system. The third volume will deal with network tasks, with a detailed description of the requisite design algorithms and generation of suitable programs. The fourth volume will describe software for the optimization of programming, and the fifth volume will deal with nonlinear programming with the objective of its optimization.

Barkin, A.I., "Otsenki kachestva nielineynykh sistem regulirovaniya (Qualitative Assessment of Nonlinear Control Systems). Nauka, Moscow 1982, 256 pp, 34 ill., price Kcs 24.

The main content is an assessment of systems for automated regulation and control with a view to nonlinearity in their basic devices and components. The author analyzes criteria of absolute stability and the problems attendant to the evaluation of absolutely stable systems. Worthy of note is the original approach to the evaluation of systems from the viewpoints of variability. It envisions the utilization of JSEP and SMEP computer technology with the aid of the new ESTIMA program, with eight subprograms devised for calculations attendant to this problem.

User-Oriented Troubleshooting Projects

Prague VYBER INFORMACI Z ORGANIZACNI A VYPOCETNI TECHNIKY in Czech No 4, 1983 pp 441-446

[Article by Eng Jan Kornek and Dr Vladimir Kosnar, Office Machines fiduciary concern organization: "For Users of Our Computer Systems"]

[Text] The introduction of computer systems, their installation and operation, and the application of software is attended by petty problems or even problems of a larger scope that make their operation considerably difficult for their users. Quality solutions to such problems are then often time-consuming and financially very demanding and their implementation in isolated application is at least uneconomical, if not economically unacceptable. For that reason the servicing and marketing organization of the Office Machines fiduciary concern organization incorporated into its plans for technical development several topics of general interest and offers the resultant solutions to users for wider application.

The following projects were completed in 1982:

1. Sectoral Project No 081-043-1008-81/85--"Polygon"

1.1 DU01, UL03--"Testing of EC 9111-14 Processors for EC 1021 and for JSEP [Uniform System of Electronic Computers] Computers Under DOS and OS Operating Systems."

Assigned task: To verify the functioning of EC 9111-14 processors for the given operating systems and hardware from the viewpoint of hardware and software under operational conditions.

Description of solution: Problem solution for EC 1021 and JSEP computers has been accomplished. Software as well as a testing system for the EC 5075 is provided. Bilateral conversion between EC 9111 and EC 1021 is provided with the aid of magnetic tape. The system was tested over a long period of time under operational conditions and the results of verifications meet the required standards.

Documentation: Technological documentation, user data.

Solver: Office Machinery fiduciary concern organization, Teplice, plant manager Comrade Josef Hajny, Kollarova Street 9, 415 00 Teplice.

1.2 DU01, UL07--"Application of ROM-CD Linear Printer in SM 3/20 and SM 4/20 Minicomputers."

Task assignment: To find a solution to connecting the ROM-CD printer to SMEP [System of Small Electronic Computers] computers (SM 3/20, SM 4/20), process documentation of the solution and verify operationally the potential for additional reproductions.

Description of solution: Selection was made of the 9389 model of the GT 1H8A-K version, which is intended for connection to JSEP systems. In this version the RJAD adapter was replaced by a SMEP adapter; the mechanical and electronic systems themselves were retained. The SMEP adapter is of original design and provides a solution to the incompatibility between the printer and the SMEP system.

The ROM-CD printer was connected by means of the proposed SMEP adapter and operationally tested in connection with the SM 3/20 computer. The testing system showed its functioning to be good and reliable.

Documentation: Technical description and functional diagram.

Solver: Office Machinery fiduciary concern organization, Brno, Comrade Ales Hradil--key solver, Veveri Street 102, 601 12 Brno.

1.3 DU01, UL08--"Application of EC 5075 Diskette Reader in EC 1033 Computers."

Task assignment: To process documentation and verify operationally the connection of the EC 5075 diskette reader to the EC 1033 computer.

Description of solution: The solution showed that connection to the computer's power supply system and the computer's channels by means of a standard interface and providing control does not call for any changes or modifications of the system. Thus, the core of the solution was operational verification, which showed a full capacity for functioning and potential for substitution of DS readers.

Documentation: Technical report.

Solver: Office Machinery fiduciary concern organization, Brno, Comrade Jaroslav Kvasnicka--key solver, Veveri Street 102, 601 12 Brno.

1.4 DU02, UL01--"Microcomputer and Microprocessor Systems for Data Acquisition."

Task assignment: To devise software including user documentation for data acquisition and processing on the basis of SPU 800.

Description of solution: The solution is a follow-up to the SPUAS multiprogram operating system applied by the Office Machines fiduciary concern organization.

The software for data acquisition and processing covers the following basic functions:

--formatting (at three levels),
--data acquisition by means of a keyboard-equipped display,
--data acquisition through OCR reader,
--input of data from a cassette or 0.5-inch magnetic tape.

Documentation: User's Handbook.

Solver: Office Machinery fiduciary concern organization, parent enterprise, Comrade Josef Novotny--key solver, Radlicka Street 2, 150 00 Prague 5.

1.5 DU02, UL02--"Testing of Operating Systems Distribution on Flexible Disks."

Task assignment: Verification of the problems encountered in distribution of the FOBOS2 operating system and components of the DOS RV V2 operating system on diskettes.

Description of solution: Two methods for the generation of operating systems from diskettes were verified as part of the solving process with the use of the PIP and/or PRESRV service programs. Overall results confirmed that diskettes can be effectively used for distribution of the given operating systems. Results of the solution serve primarily the purposes of NOTO [National Technical Service Organizations], informatively for users' system programmers.

Documentation: Technical report, descriptions of generations.

Solver: Office Machinery fiduciary concern organization, Ostrava, Comrade Eng Karel Svoboda--head of Systems Inspection, Gottwaldova Street 209, 701 00 Ostrava.

2. Sectoral Project No 081-044-1008-81/85--"Development of Services for Computer Graphics"

2.1 DU01, UL01--"Project for Recording of Users."

Task assignment: To provide an automated record of users of computer graphics systems.

Description of solution: The project for keeping a record of computer graphics users is done with the use of the ADT 4500 computer. The data base is stored in data bank form and is controlled by the ADT-SRDZ system. The data base is continuously updated and serves for operational providing of information about:

--organizations,
--the employed hardware,
--the employed application software in various combinations.

Documentation: Project for Keeping a Record of Users of Computer Graphics.

Solver: Office Machinery fiduciary concern organization, parent enterprise Prague--Graphic Systems, Comrade Eng Jaroslav Bruna--key solver, Rytirska Street 22, 110 00 Prague 1.

3. Sectoral Project No 081-045-1008-81/85--"Development of Anti-Import Measures and of Exports"

3.1 DU01, UL04--"Application of EC 6016 Card Reader in EC 1033 Computer."

Description of solution: The project deals with the problem of connecting the EC 6016 system to the EC 1033 power supply system, connection into the multiplex channel's systems arrangement by means of signal interface, and providing and testing suitable testing programs.

Documentation: Technical report.

Solver: Office Machinery fiduciary concern organization, Brno, Comrade Eng Milan Prudik--key solver, Veveri Street 102, 601 12 Brno.

3.2 DU01, UL05--"Connecting the EC 7902 Perforated Tape System of Czechoslovak Production to the EC 1040 Computer."

Task assignment: To propose and verify operationally connecting of the EC 7902 perforated tape system of Czechoslovak production to the EC 1040 computer in order to replace completely the function of the system still in use, imported from Poland.

Description of solution: The solution progressed in three stages:

--devising of conceptual proposal and technical design,
--verification of solution on a functional sample,
--working out of technical documentation facilitating reproducible implementation.

Documentation: Technical report.

Solver: Office Machinery fiduciary concern organization, Comrade Eng Zdenek Spigel--key solver, Veveri Street 102, 601 12 Brno.

3.3 DU01, UL06--"Proposed Control-Unit Simulator for the PT 105 and PT 305 Magnetic Tape Units."

Task assignment: To propose an integrated simulator of the control unit for PT 105 and PT 305 magnetic tape memories to facilitate repair of tape units in servicing and in the laboratory.

Description of solution: The devised simulator is intended for testing and setting correct function of magnetic units in the scope of:

--control of transmission and reception of instructions,
--control of correct transmission of information on recording plates and reading,
--control and setting of time signals.

The simulator is located on the casing and its control panel consists of two pushbuttons and two bushings.

The devised simulator was operationally tested with success and meets the required standards.

Documentation: Technical description and drawings.

Solver: Office Machinery fiduciary concern organization, Hradec Kralove, Comrade Vladimir Kudym--key solver, Resslova Street 935, 501 95 Hradec Kralove.

4. Sectoral Project No 081-046-1008-81/85--"Efficiency Promotion Measures Within KSR [Comprehensive Socialist Efficiency Promotion]."

4.1 DU01, UL09--"Efficiency and Reliability of JSEP Hardware."

Task assignment: To concentrate information and experience regarding the efficiency and operational reliability of JSEP 1 hardware from the viewpoint of NOTO in relation to internationally adopted documentation.

Description of solution: The task solution corresponds to the assignment and covers the following areas:

--general characterization of economic effectiveness,
--delineation of factors affecting economic effectiveness,
--effects of JSEP computers' hardware and software on economic efficiency of their operation,
--monitoring and recordkeeping methods.

Documentation: Study, appendices and bibliography.

Solver: Office Machinery fiduciary concern organization, parent enterprise Prague, production sector, Comrade Eng Zdenek Vokac--key solver, Husitska Street 36, 130 00 Prague 3.

4.2 DU01, UL10--"Methodology for Devising Technological Processes in Sector 403."

Task assignment: To propose an objective system for devising technological processes and standardization in keeping with the requirements on expedient and economically justified introduction of servicing for new computer technology systems.

Description of solution: Methodological material intended primarily for service organizations of NOTO. Sample technological procedures were worked out, depending on the type of repairs, for 21 representatives of computer hardware.

The methodology forms an open system which improves efficiency in the preproduction stage of servicing in linkage to machine processing.

Documentation: Methodological material.

Solver: Office Machinery fiduciary concern organization, parent enterprise Prague, production sector, Comrade Eng Zdenek Vokac--key solver, Husitska Street 36, 130 00 Prague 3.

4.3 DU01, UL11--"Specifications for EC 1025 Computer Maintenance."

Task assignment: To work out a uniform approach to conducting regular technical inspections and operations for the EC 1025 computers.

Description of solution: The resultant material is intended for technicians of central and user servicing facilities. Individual chapters describe the requirements on the work environment, work safety, planned preventive activities in varying cycles, an outline of measuring instrumentation and consumption of operational materials.

Documentation: Methodological material.

Solver: Office Machinery fiduciary concern organization, parent enterprise Prague, production sector, Comrade Eng Jaroslav Horak--key solver, Husitska Street 36, 130 00 Prague 3.

4.4 DU01, UL12--"Programmable Hardware III."

Task assignment: To concentrate information and describe new systems and problems in a given field in the form of a technical handbook.

Description of solution: The resultant material includes six basic parts:

--problems relevant to connecting of input and output systems to microcomputers,
--INTEL circuits for connection of V/V systems,
--problems encountered in diagnostics of microprocessor memory,
--S 100 and MULTIBUS busbars,
--modular systems and TNS microcomputer systems,
--training computers of Czechoslovak production (TEMS 80-03A).

Documentation: Technical handbook.

Solver: Office Machinery fiduciary concern organization, parent enterprise Prague, production sector, Comrade Eng Vaclav Honzik--key solver, Husitska Street 36, 130 00 Prague 3.

4.5 DU01, UL13--"Providing Measuring and Diagnostic Instrumentation for JSEP and SMEP Systems."

Task assignment: To propose diagnostic and measuring methods for carrying out repairs of special electronic modules and verify experimentally the proposed specialized devices.

Description of solution: Selected in the introductory stage and dealt with in the subsequent stage were the following devices and methods:

--TMP 80 tester for SM 5300 magnetic tape units,
--TPZ 80 tester for EC 7039 catenary printers,
--logic tests for EC 5004 magnetic memory units.

The system serves for testing of peripheral devices by means of original diagnostic procedures and facilitates repairs in own service laboratories.

The task results will be used primarily in NOTO servicing organizations and in devising specialized operational facilities.

Documentation: Technical reports and drawings.

Solver: Office Machinery fiduciary concern organization, parent enterprise Prague, production sector, Comrade Eng Milan Cech--key solver, Husitska Street 36, 130 00 Prague 3.

4.6 DU01, UL14--"Monitoring of EC 1025 Computer's Breakdown Rate."

Task assignment: To monitor the breakdown rate of the EC 1025 system components during installation and in routine operation. On the basis of breakdown rate analysis to propose the required specialization and equipping of installation and servicing teams.

Description of solution: Breakdown rate of computers was monitored in the East Bohemia Kraj. Attention was devoted primarily to:

--types of breakdowns,
--operational indicators,

--analysis of breakdown rate,
--measures for reducing the breakdown rate.

In addition to the required results the material includes recommendations for improving the reliability of EC 1025 computers.

Documentation: Report.

Solver: Office Machinery fiduciary concern organization, Hradec Kralove, Comrade Eng Miroslav Semenec--key solver, Nikodymova Street 405, 501 95 Hradec Kralove.

4.7 DU01, UL15--"Uniform Technological Documentation for Computer Technology Systems (JSEP and SMEP)."

Task assignment: To propose standardization measures for uniform technological documentation with regard to format, configuration, arrangement and presentation of documentation.

Description of solution: The solution contains a proposal for a new uniform classification of original documentation under conditions of the present organization as well as under new model conditions. On the basis of recommended continuous technical analysis the solution was modified and supplemented by a part dealing with drawing wiring diagrams of digital computer technology. The material is intended primarily to meet the needs of centralized servicing.

Documentation: Proposed standardization material.

Solver: Office machinery fiduciary concern organization, Brno, Comrade Eng Bohumil Zvacek--key solver, Veveri Street 102, 601 12 Brno.

4.8 DU01, UL16--"Proposed Design of an All-purpose Testing Device for Special Modules of SM 3/20 and SM 4/20 Computers."

Task assignment: To propose a design of a testing device affording connection of a wide assortment of special SMEP modules, facilitating testing of modules in higher functional units.

Description of solution: The solution includes a device, under the designation MASIS SM, which is a small simulation modular assembly for controlling the functioning and for repair of exchangeable modules of SMEP peripheral units. The device has a wide connector field for connection of an external automated tester. The solution, intended primarily to meet the needs of central servicing, made possible the introduction of laboratory repairs of exchangeable SM 5400 modules.

Documentation: Technical report and drawings.

Solver: Office Machinery fiduciary concern organization, Ostrava, Comrade Eng Vladimir Krob--key solver, Gottwaldova Street 209, 701 00 Ostrava 1.

4.9 DU02, UL01--"Promoting Efficiency in Enterprise Operations by Micrography."

Task assignment: To devise increased efficiency for enterprise operations by means of micrography in connection with the introduction of centralized coordination in a commercial engineering organization. To devise new forms of documentation for providing all points under sectoral control with information.

Description of solution: The completed solution stage includes:

--comprehensive documentation about a product in microfiche form for marketing, technical and engineering services,

--micrographic VTEI [Scientific, Technical and Economic Information] outputs for coordination centers,

--micrographic design of ASRP [Automated System for Enterprise Management] outputs,

--verification of microfiche manuals.

Documentation: Partial projects of individual tasks.

Solver: Office Machinery fiduciary concern organization, parent enterprise Prague, marketing sector, Comrade Dr Stanislav Konecny--key solver, Perstyn 6, 111 90 Prague 1.

Comprehensive information about projects can be requested from Eng Jan Korinek, Dr Vladimir Kosnar, Office Machinery fiduciary concern organization, Husitska Street 11, 130 00 Prague 3, telephone 27 43 51, extension 21.

SMEP Hardware, Software

Prague VYBER INFORMACI Z ORGANIZACNI A VYPOCETNI TECHNIKY in Czech No 4, 1983 pp 499-504

[Article by Eng Jaroslav Dvorak, Office Machinery fiduciary concern organization: "SMEP Hardware and Software"]

[Text] In devising the system VARS SMEP [multilevel automated control system for the system of small electronic computers] the principle of using individual hardware and software resources for devising individual subsystems was adopted. Envisioned for the area of hardware are SM 4/20 and or SM 52/11 computers equipped with standard peripheral equipment available to users. The scope of devising individual subsystems and the limited availability of external memories called for limiting each subsystem to three sets of available cassette disk memories and to two sets of magnetic tape memories.

In the selection of a suitable operating system, prime consideration was given to requirements for the preparation and preprocessing of data for a multiuser multiprogram access allowing operation in real time and to prospective support for a universal system of data base control for SMEP computers.

The selected requirements were best met by the 2.0 version of the DOS RV operating system supplemented by systems RSZ [Control System for Data Recording], DTS and SORT.

The following text offers an outline and description of the initial prerequisites in the area of software for application of the VARS SMEP system.

Operating System DOS RV Version 2.0

The DOS RV operating system is a flexible event-controlled multiprogram system intended for a wide scale of applications.

The DOS RV operating system intended for devising applicational-type software for VARS SMEP, i.e., for mass data processing, must include the following specific properties:

--equipment for V/V FILES-11 and RSZ services,

--equipment for dynamic checkpointing of tasks,

--equipment for dynamic assignment of working memory and its automatic compression,

--directives for memory administration, directives for transmitting and receiving references and directives for mapping virtual addresses into physical,

--safeguards among users,

--equipment for ANSI magnetic tape,

--functions for automatic printout of reports regarding abnormal completion of tasks and states of the system's unreadiness,

--directives for acquisition of memory states, directives for communication between cooperating tasks,

--directives for changing the priority of tasks being processed,

--functions for expansion of addressing space,

--functions for full utilization of RUN instructions,

--potential for use of logic and clearing [zero setting] systems,

--user-oriented terminal control,

--cyclic assignment of tasks in a typical range of priorities 1-100 and dynamic change of priority for checkpointing with a modification value of 5,

--potential for using the full extent of the 124 K word memory capacity,

--possibility for controlling the recording of data on disks,

--GEN area with a minimum extent of 440,000 bytes,

--programs BIGFCP, MCRMU, SYS, TKTN, MTAACP, FOSMSG, BOO, DMO, AT, INI, INS, MOU, SAV, UFD, LOA, UNL, HEL, BYE, ACNT, BRO, SHUTUP, ACS, SHF, PRT, BIGTKB, LBR, DMP,

--programs FLX and PIP adapted for ANSI magnetic tape,

--program SORT adapted for magnetic tape,

--residential library RSZ of standard scope,

--translators COBOL, FORTRAN, MACROASSEMBLER,

--programs DTS.

RSZ Control System of Data Recording

RSZ is a system of program routines facilitating the processing of data sets in the DOS RV operating system. It provides for the transmission of data between user programs which operate with data in the form of logic entries and an operating system which controls data on physical level. It is a voluminous high-performance system.

RSZ requires for its operation that the user's data be in a certain form with which it is then capable of performing the required operations. Data are stored in the system for processing in sets. Sets then consist of groups of logically connected data--recordings. The manner of storage of recordings in a set is called set organization. Set organizations admissible for RSZ operation are sequential, relative and indexing.

RSZ can be used for programming in COBOL, BASIC-PLUS-2 and MACROASSEMBLER.

The DTS query system accepts instructions from the user and reacts by extracting RSZ set data which it can also modify or supplement. The entire process takes place in an interactive mode and offers many advantages. Operation with DTS is of the dialogue type.

A part of DTS is a generator of layouts which operates with DTS data or directly with RSZ sets data and prints out data according to the format specified by the user. DTS also makes it possible to define and use procedures called up by their name. Definitions of procedures, recordings and domains are stored in a standard manner in a data dictionary. The generation and maintenance of information in the data dictionary is the responsibility of the data base administrator. Access to information from the dictionary is afforded on the basis of an a priori declared right to handling of data, and mere display for certain users.

System for Preparation and Preprocessing of Data

The GOLEM V.4.2 and PMDS systems can be used for the preparation and preprocessing of data. Both of these systems are supported by the DOS RV operating system.

The GOLEM V.4.1 system is a set of all-purpose application programs designed for the preparation and preprocessing of data. The system uses selected SMEP hardware that is currently available to users.

System hardware:

--SM 4-20 processor,
--128 K word working memory,
--CM 7202 (1-8 terminals) alphanumeric terminals,
--external memory on cassette disk (DK Ø - DK 7),
--external memory on magnetic tape (MT Ø. MT 1),
--linear or mosaic printer,
--perforated tape reader and puncher,
--external memory on flexible disk (DX Ø - DX 3).

System software:

The GOLEM V.4.1 system includes all-purpose software:

--programs for operation with FORMAT,

--programs for the preprocessing of data (connecting batches in disks, sorting during other terminals' operation, transcription of batches onto magnetic tape),

--programs for operators (data entry, data testing, data updating, data search and changes).

The length of the processed field is 1 to 66 characters. The maximum sentence length is 512 bytes (minimum 1 byte). The maximum number of fields in a sentence is 42.

Batch size is limited to a maximum number of 9,999 sentences. A batch does not require connected space on a disk medium. The number of batches stored simultaneously on a cassette disk depends on the number of connected disk areas (media), as does batch size. Approximately 32,000 sentences of 128 byte length can be stored on two disk areas. One cannot be located on two areas.

The use of virtual sets affords the operator with unlimited handling of a sentence within a batch. Each has an individually determined maximum number of sentences. This number can be exceeded to a certain extent.

Each field has an individually determined position on the display tube, i.e., line and column. This makes the display approximate the input document. The entry of individual fields need not follow a top to bottom and left to right

sequence. It is fully controlled by the user. The user must determine the position of a field to prevent them from intermixing on the display tube.

The preprocessing of data is made possible by connecting batches on a disk and by sorting. In the course of prerecording of batches on magnetic tape it is possible to convert data into the EBCDIC code. The structure of a sentence on the disk and on magnetic tape must be identical. Sorting is done during the operation of other terminals. The sorting speed is comparable to the printout of batches on a mosaic printer. Sorting occurs in place, i.e., the product of sorting is the same batch to which the operator has access. It is possible to use one continuous code of 1 to 512 character length.

Limiting factors in the GOLEM V.4.1 system:

--number of FORMAT	max. 19
--number of batches	max. 999
--length of recording (sentence)	max. 512 characters (fixed length)
--number of fields	max. 42

The GOLEM V.4.1 system operates under the DOS-RV V2 operating system.

Minimal configuration of hardware:

--SM 4-20 processor with 128 K word memory,
--CM 7202 terminal (1 unit),
--external memory on cassette disk (1 unit of which one area for GOLEM),
--external memory on magentic tape (1 unit).

(Additional information about the functional possibilities of the GOLEM V.4.1 system and conditions for its distribution can be obtained from personnel of organizations of the Office Machinery fiduciary concern organization, telephone Prague 54 49 26, Ostrava 23 17 60 and Datasystem, f.c.o., telephone Bratislava 22 61 40.)

PDMS System

The objective of the PDMS program system for processing data of matrix structure is to facilitate the recording and initial processing of information structures on input into processing, primarily of an economic or technical nature. PDMS provides for basic operations above input structures so that the result of processing are data sets in which individual sentences and their structures meet the relevant specifications and their configuration is adapted to the requirements of the relevant application programs. The basic orientation of the PDMS system is in the areas of:

1. Preprocessing of a system of reports with linear structure.

2. Processing of batches of homogeneous sentences without linear structure.

Basic functional properties of the PDMS system:

1. Generation of the so-called definition of the recorded structure in the mode question-answer.

2. Recording data structure by batches with simultaneous control and mapping into output sets in the sense of the definition subpoint 1.

3. Interactive recording of data structure with simultaneous control and mapping into output sets in the sense of definition subpoint 1.

4. Updating of data structure with simultaneous control and mapping into output sets in the sense of the definition subpoint 1.

5. Control of recorded information for the presence of absence of codes in reference index sets.

6. Auxiliary functions (sentence blocking, dividing of sorted out sets into subsets).

Basic function of parts of the PDMS system based on definition of structure:

1. Processing of information that identifies structure. This makes it possible to use ID information (e.g., report heading) to supplement sentence fields of an output set, or their duplication, and to copy ID information into the first sentence of an output set.

2. Mapping of sentences of input structure into sentences of the output set. The system makes it possible to assign random mutual sequences of fields, to supplement fields, or duplicate them; during transcription it is possible to control the type of field element, its alignment to the right or left and to add a random character.

3. Control of the presence of obligatory lines.

4. Preventing description of specified lines.

5. Linkages between elements of the structure, either in specified columns, or in all columns of the structure.

Linkage takes the form:

X1OPX2OPX3.....RELOP XN

where X1, X2, X3.....XN are identifiers of lines of the structure,

OP is arithmetic operator (admissible are +, -, x, 1),

RELOP is relational operator (admissible are >, <, >=, <=, =, <>).

A direct or indirect constant can be used instead of the line identifier. The direct constant is put in directly by its value (entry takes the form KNN...N, where K is identifier of direct constant, N...N is its value, which can be integral or real).

Indirect constant is put in by its number (entered in the form CN, where N is from the interval of 1-9) and, if it is to be used, the relevant program will call for it at the time of processing.

6. Special linkages between selected elements of the matrix take the form:

(X1, Y1) OP (X2, Y2) RELOP (X3, Y3)

where X assigns column number,

Y assigns line identifier of the selected element of the structure,

for OP and RELOP the same applies as in linkages.

7. Comparison with direct or indirect constant:

—of selected elements of the structure,
--of all elements of a selected column,
--of all elements of a selected line,
--of all elements of the structure.

Comparison can be made by the above-mentioned relational operators.

8. Control by line and column totals.

9. Control of the presence or absence of a selected code against a side set with index organization.

10. Automatic start-up of a randomly installed user program for subsequent specific preprocessing of the set's output.

Layout Generator

The layout generator works on the basis of parametric instructions stored in the instructional set on a magnetic disk. After call-up the generator requests specification of the instructional set, locates the set on the magnetic disk and starts processing individual instructions line by line. Each instruction undergoes syntactic and thematic control, after which the parameters are entered into operational tables and fields and are ready for further use. Syntax and limitations are defined for each instruction independently. If an error is detected during control, the relevant error report is printed out on the terminal and the program is terminated.

The PAM subsystem--from the viewpoint of R&D and the intent of the design team at the School of Economics in Prague to verify new methods and approaches--is being dealt with under the operating program DIAMS.

OS/ES 6.1 Operating System

Prague VYBER INFORMACI Z ORGANIZACNI A VYPOCETNI TECHNIKY in Czech No 4, 1983 pp 504-509

[Article by Eng E. Rudolph, Robotron Combine, ZFT Dresden: "Additive Components for the OS/ES 6.1 Operating System's Modification 8 From the Robotron Combine"]

[Text] Together with the EC 1055 M computer system, the Robotron Combine now delivers the operating system (BS) OS/EC 6.1, modification 2 (2). This operating system promotes economic utilization of the EC 1055 and EC 1055 M computers, expands their potential applications and improves their efficiency. The Robotron Combine offers many additive components to the basic set of the operating system. These additive components include programming systems for the higher programming languages COBOL, FORTRAN, PL/1 and PASCAL as well as service programs for support in program generation and for maintenance of user programs and user data sets. These additive components are supplied on the basis of independent agreements.

The additive component "Program for User Support" TSO originated from the need to deal with various problems of dialogue without substantially affecting batch-type processing. It makes it possible for a great number of users of terminals to use the resources of the OS/EC operating system and, thanks to the assignment algorithm, each of the participants is under the impression that he is the only user. Various safeguards make interference among participants impossible and prevent unauthorized access to the data of another subscriber. The operator can start, stop or modify the TSO without interrupting batch processing jobs. At the same time, several subscribers can work on the same or different tasks simultaneously. The subscriber can use sets, program libraries of all organizational forms of sets of the operating system, all compilers, service programs and auxiliary systemic programs.

TSO application is recommended particularly:

--in the development of programs in dialogue,

--in the transfer of tasks from terminal stations to batch processing and output of results on terminal or on printer,

--for the generation and maintenance of sets which contain source text, data, task handling instructions, instructional procedures or random text,

--in the processing of dialogue programs developed by the user.

TSO has been in use in the Robotron Combine's ZFT center in Dresden for several years in the development of programs for the EC 1040 and EC 1055 computers. Thanks to its use, the time needed for the development of programs has been substantially reduced. Efficiency improvement ranges between 30 and 50 percent. Of particular benefit is the utilization of dialogue text (Dialogtext), the possibilities of which exceed by far the testing possibilities

in batch processing and result, in addition to reducing the time needed for development, in increased reliability of the programs. The use of TSO requires a computer with a medium or higher performance class, such as the EC 1040 or EC 1055 M, with minimum main memory capacity of 512 KB.

The pair PL1 PL1-OC optimization compiler and PL1-(PL1-TC) testing compiler, which is already known in the CSSR, meets the requirements of fast testing and fast execution of the PL1 program.

With the aid of the PL1-TC compiler it is possible to generate programs economically, i.e., accelerate the steps from program proposal to a logically correct PL1 program. The PL1-TC compiler offers excellent potential for identification of errors and their correction in the execution of the PL1 program. These possibilities can be used to their full extent in the OS/EC operating system with the TSO program and also in the system of virtual machines (SVM/ES) with a programming and testing system (PTS) in dialogue mode of operation.

In these operating systems the call-up of PL1-TC is realized by means of TSO or PTS instructions from one of the terminal points. The programmer has the opportunity to carry out program modifications from the terminal data point. These involve:

—changes in source text,
—temporary incorporation and deletion of PL1 text,
—printout of actual source text,
—printout of individual symbols,
—storage of changed source text,
—restoration of PL1 source text translation,
—interruption of translation,
—transfer into TSO or PTS mode to facilitate the carrying out of other TSO or PTS instructions,
—call-up of HELP function.

In addition to these opportunities—which can be used only in dialogue mode of operation—the PL1-TC also processes instructions in the PL1 source text for procedural recording of changes in values for monitoring the progress of the program and for determining the frequency rate of carrying out instructions.

After texting the PL/1 program with the aid of PL1-TC and after verifying its logic correctness it is possible to generate a target program which is effective from the viewpoint of machine time. At the same time there is no need to remove instructions that served for testing of the program which is done automatically by the PL1-OC. Both compilers are compatible in language scope. Let us point out several PL1-OC optimizations:

—simplification of terms,
—elimination of superfluous terms,
—placing computation of invariables ahead of loops,
—effective initialing of fields of structures,
—to a considerable extent also elimination of transposition of basic registers during jumps and other efficiency improvements.

The type and degree of optimization depend on the language elements employed, on the structure and the size of program and also on effective conditions for their selection.

Optimized programs call on the average for 20 to 30 percent less running time than programs translated by the normal PL1 compiler.

Both compilers are independently generated components and are suited for batch and dialogue mode. They can operate during configurations of MFT, MVT and SVS control program of the OS/EC operating system on EC 1040, EC 1055 and EC 1055 M systems.

An identical increase in efficiency with the aid of special compilers is also possible for the COBOL programming language.

The programming system COBOL (PS COBOL) is based on ISO norm of the COBOL language. It can be used for programming, translation, testing and running programs written in COBOL.

The programming system includes:

--a compiler,
--a library,
--a dialogue tester,
--a mediating program.

The compiler generates from source programs in COBOL target programs. The library contains programs required for running programs in COBOL. The mediating program serves for compiler call-up during operation in TSO. The requisite sets are thereby assigned automatically.

The dialogue tester permits the testing of programs in COBOL in dialogue from one terminal. By means of special subordinate instructions (orders) it can perform such testing functions as sequencing, interrupting and start-up of a program at random points, output and input of data values and other operations. The dialogue tester operates only during TSO control.

The extent of the COBOL language programming system shows the following expansions in comparison with the former COBOL language of the OS/EC operating system:

--external decimal set with separate sign,
--processing of character chains,
--determination of the sequence of sorting,
--less rigid punctuation rules,
--mixed indication (index name, literal),
--dynamic program call-up,
--support for remote data processing.

All this offers to users new possibilities for the administration and processing of data sets, organization of program combining, remote data processing and

their use. The compiler of the COBOL programming system offers in comparison to the standard compiler of the OS/ES operating system the following possibilities:

--optimization of target code,
--generation of sorted documentary lists of symbols,
--translation of a larger number of programs in one step,
--dynamic call-up of COBOL programs from the library and from programs in COBOL,
--syntax control,
--symbolic testing,
--testing in dialogue with the aid of TSO.

The PS COBOL programming system can operate in MFT, MVT and SVS configurations of the control program of the OS/ES operating system.

For the programming language FORTRAN the ROBOTRON compiler offers the programming system FORTRAN (PS FORTRAN) and the FORTRAN OE-Compiler.

The implementation of the FORTRAN language is based on the norm ANSI (X.3.9.-1966) and on several expansions.

The following belong to the FORTRAN programming language:

--FORTRAN CC compiler,
--FORTRAN SE compiler (expanded standard compiler),
--CONVERT conversion program (conversion from free into standard format),
--mediator for these components for call up in TSO,
--dialogue tester,
--library in FORTRAN usable also for the OE compiler.

These components enable the user to utilize the system in batch operation and in TSO operation. In TSO the subscriber can develop and test programs during uninterrupted dialogue with the computer while operationally obtaining the results. The time for testing of programs is considerably reduced.

Performance of Individual Components of PS FORTRAN Programming Language:

The FORTRAN CC compiler is intended first of all for operation in TSO mode. It translates very rapidly, without following thereby the generation of effective programs. Programs in TSO are processed immediately so that test results are expediently available. Instructions can be inserted in standard or in free format (variable length up to 1,326 characters).

The CC compiler is suited primarily for the solution of limited tasks of a nonrecurrent nature, if the results are to be obtained promptly. The FORTRAN CC compiler can also be used for batch and TSO mode operation. In both modes of operation the compiler generates an effective target modulus, provides printouts that guarantee program documentation and transmits messages that make program testing possible. The SE compiler is a standard compiler version expanded as follows:

—expanded language possibilities thanks to the processing of input and output instructions controlled by their list,

—improved algorithms for data conversion,

—adaptation for operation in TSO by means of simple and easily available means for compiler call-up,

—use of selection conditions for varying translation results, easier testing and minimum demands on the time-consuming maintenance of developed programs.

The dialogue tester supports the testing of programs in COBOL and TSO. In preparation for testing it is possible to process both target moduli generated by both compilers in the dialogue tester mode. Depending on the obtained results, the user can change from the data station the sequence for carrying out instructions, ask for display of data and modify it and, in addition, give instructions for carrying out various service functions. The library of programs in FORTRAN contains modules for the implementation of standard functions on input and output as well as of other functions for the PS FORTRAN programming system and for the FORTRAN OE compiler. The FORTRAN OE optimization compiler, which is an expanded version of the existing FORTRAN OP compiler, is suited primarily for scientific and technical engineering tasks. The compiler generates an optimal target code. While it does prolong translation time, it requires less space in the memory and it cuts down on the running time of programs. It guarantees input and syntactic analysis of source programs, conversion of source programs into the target code as well as output of translation results and report of errors.

FORTRAN OE compiler generating must be combined with the PS FORTRAN library. All tested programs can be translated in the last step by the FORTRAN OE optimizing compiler. FORTRAN OE can be used with all systems of the JSEP series 1 and 2 with the BS OS/ES operating system since the 4.0 edition.

The PASCAL programming system (PS PASCAL) is offered by the Robotron Combine as another new additive component for the BS OS/ES 6.1 operating system. The attained language scope conforms to the proposed BSI/ISO norm for PASCAL. The PASCAL language is used in programming tasks for processing information in the fields of science, technology and commerce. It can be learned easily, facilitates orientation and structured programming and its structure and concept are conducive to programming without errors. It is an ideal language for training and is often used in systemic programming. The PS PASCAL is an independently generated component for use in OS/EX and SVM/ES.

The programming system consists of:

—a batch compiler,
—a dialogue compiler and
—a library of PASCAL programs (PASCAL-Bibliothek).

PASCAL compilers convert source programs in PASCAL into target moduli in several steps. At the same time they verify the syntactic correctness of the programs. Here, depending on conditions of selection, it is possible to adapt the

contents and format of compilations during translation to meet the user's demands on the state of development of programs (conditional translation of commentaries, verification of adherence to limits on extent, analysis of error reports).

For operation in the dialogue mode there is available a mediating program for translation as well as a program for processing instructions for interactive execution of programs in PASCAL. The testing of programs in PASCAL is supported by special subinstructions. It is possible to determine random points for interruption and erase them subsequently, count the frequency of performance of a single instruction, schedule execution of programs in PASCAL monitor the values of variables at points of interruption, the source text and the instructions counter and assign new values. Adherence to OS/ES conventions facilitates connection in FORTRAN, COBOL and PASCAL programs. The PASCAL batch compiler operates under control program configurations MFT, MVT and SVS of the BS OS/ES 6.1, modification 8 operating system. The PASCAL dialogue compiler operates under PTS SVM/EX, edition 2.1, under TSO MVT 1.3 as well as under TSO SVS 1.1.

The Robotron combine is developing a second language translator for Assembler, the Assembler 2 (ASS2), as another part of the operating system.

In comparison to the previously used Assembler, the new Assembler is characterized by an expanded language scope and shorter translation time. In principle, all programs that were programmed in accordance with the still valid coding rules for Assembler can be translated without any changes by the Assembler ASS2, facilitating the attainment of identical results.

Improvements over the standard compiler consist in:

--cutting translation time by up to 30 percent,
--the ASS2 requires a single operating set (3 up to now),
--expansion of language elements,
--conditional translation by means of an alternative instruction format (instructions SET, LCL, GBL, AIF, AGO),
--improved error spotting for macroprocessing by means of MHELP functions in source texts that schedule the process of maker (Makros) generation,
--translation of several source modules in a single sequence.

The ASS2 component can be operated on EC 1040, EC 1022, EC 1055, EC 1055 M and EC 1035 computers. Minimum requirements on main memory is 192 KB.

The Robotron ZFT plant in Dresden developed last year a new sorting and compiling program. It was designated "Sortieren/Mischen 2" ("Sorting/Compiling 2") and, in comparison to the old program for sorting and compiling, it is characterized by expanded functions and higher efficiency. Since the "Sortieren/Mischen 2" program uses an expanded supply of JSEP instructions, it can be used only with JSEP series 2 systems. The program was tested on the EC 1055 and EC 1035 systems. Starting with edition 6.1, the program operates in the MFT, MVT and SVS mode of the OS/ES operating system and is compatible with the extant program for sorting and compiling.

The key functional expansions include:

--sorting and compiling of VSAM sets,

—sorting in main memory (if the main memory can accommodate the sorted data, no use is made of auxiliary memories),

--high-speed sorting PEER as on a disk (a maximum of 100 ranges can be defined on direct access systems for auxiliary storage in memory),

—maximum field length in sorting is 4,092 bytes (256 up to now), the sorting criterion consists of 1-64 fields, each field consists of 1-256 bytes,

—test points can also be used in compiling,

--compiling can also be called up as a subprogram.

An efficiency survey showed average machine time servings of 15 to 20 percent in operations with the new sorting program in handling identical tasks by the old and new sorting and compiling program. Limit values of time savings are on the order of 30 to 40 percent. Statistics show that an average of 20 percent of computer time is spent on sorting and compiling. With 7000 annual productive hours of a computer, use of the "Sortieren/Mischen 2" program represents a saving of approximately 250 hours of machine time. A modified version of the "Sortieren/Mischen 2" program is being prepared by ZFT for users of the JSEP series 1 systems, e.g., the EC 1040.

Additional inquiries regarding the assortment and performance of individual systems will be readily answered by the Center for Research and Technology (ZFT) Robotron, Leningrad Street 15, GDR 8012.

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Hungarian Videoton Products in CSSR

Prague VYBER INFORMACI Z ORGANIZACNI A VYPOCETNI TECHNIKY in Czech No 4, 1983 pp 537-539

[Article by Eng Pavel Stauber, Office Machines Plzen: "Ten Years of Videoton Technology on the Czechoslovak Market"]

[Text] This year marks the 10th year since the Videoton company from Hungary introduced on our market the products of its youngest production sector--computer technology. That occurred at the International Machinery Fair of 1973

in Brno. At that time our technical public was introduced to the Uniform System of Electronic Computers series JSEP 1 and its smallest member, the EC 1010 computer from the Videoton plant in Hungary. Of course, Videoton was not unknown on our market even prior to that date, since the subconscious of the public it figured as a manufacturer of high-quality consumer electronics--television sets, radio sets and tape recorders. Consumer electronics constituted its original production program in 1954, which also marks the date of the Videoton plants' establishment.

Today the Videoton plants represent a large production complex with 18,000 personnel, its own research and development centers, electronic laboratories, a training center as well as a marketing and servicing network. The annual production volume amounts to 11 billion forints. Successes in the field of consumer electronics inevitably led in 1970 to further expansion of the production program by the attractive field of computer technology. The Videoton plant employs in this field approximately 4,000 personnel with an annual production volume of almost 5 billion forints. This represents annually in key items production on the order of 200 computer systems, 2,000 line printers and 5,000 display units.

A manufacturer with comparable production understandably cannot confine his activities within the borders of his own country. Activity in international relations has been characteristic of the Videoton company. After all, its successful entry among leading producers of computer technology in CEMA and its attainment of a good, often outstanding technical level was occasioned by international cooperation, procurement of licenses and continued monitoring of developmental trends in this so tumultuously developing field. And the Videoton company can meet these obligations very well.

The procurement of licenses, technology, elements of the parts base must often be paid for in convertible currency, 80 percent of production goes for exports, whether to CEMA, capitalist or developing countries, particularly high-quality peripheral devices that sell well on capitalist markets. It is for these purposes that Videoton operates its own foreign trade enterprise, Videoton AG Budapest, which has foreign representatives in Moscow, Prague, Berlin, Warsaw, Sofia, Belgrade, Vienna, Munich, Helsinki, Cairo and New Delhi. A substantial volume of exports of computer technology products is directed to approximately 20 countries. The longest standing customer for computer technology products is the Soviet Union. Czechoslovakia ranks second in volume.

The first Videoton computer system supplied to Czechoslovakia was the EC 1010 computer for the Institute of Nuclear Physics in Prague-Rez. The contract was signed in Brno at the International Machinery Fair in September of 1973. The reason why such a demanding customer was supplied with the EC 1010 system was the computer's modern concept and a wide selection of peripheral systems, in some cases specialized, that were not routinely supplied with the computers. This motivation was characteristic of many other, often exceptional applications of computer systems bearing the Videoton trademark. In addition to the representatives of Videotron and of PZO [foreign trade enterprise] KOVO, the inception of this contract was witnessed by personnel of the regional enterprise Office Machines in Plzen. The latter enterprise was subsequently

authorized to become the key marketing center for Videotron products. It is still carrying out this function with the proviso that as of 1 January 1982 the business agenda in the context of a new organizational arrangement was transferred to the parent enterprise in Prague.

Fig. 1.

Fig. 2

Some 140 computers have been supplied to Czechoslovakia over the past 10 years for use in the most varied branches of our economic life. This has involved computers EC 1010, EC 1011, Videoplex data acquisition systems, and also considerably represented were peripheral systems. Imports of highly reliable alphanumeric display units were on the order of 1,000 units, including line printers and disk units. The importation of high-performance peripheral systems was of key importance to final assembly in the production of Czechoslovak computers, particularly ADT and SMEP [System of Small Electronic Computers]. The total trade turnover for the past decade amounts to R 110 million.

The significance of application of Videoton computers can be illustrated by many specific examples. A large customer for the EC 1010 and EC 1011 computers became Air Traffic Control Prague. The New Metallurgical Plants of Klement Gottwald in Ostrava used several EC 1010 computers for automation of a more effective control of blast furnaces and coking batteries. The recent nationwide census benefited from the use of 14 Videoplex data acquisition systems. The Central Dispatching Organization in Prague controls the exchange of electric energy among CEMA countries. We could name many other interesting applications, such as, e.g., the use of EC 1010 and EC 1011 computers in the Bulovka hospital, many mines of the Ostrava-Karvinna Basin in Ostrava, the Institute for Computer Technology in Civil Engineering, regional organs in Brno, the Skoda enterprise in Plzen, design and research institutes, etc. In all cases the products of Videotron computer technology have been successfully applied.

On the occasion of the 10th anniversary of Videoton activity on the Czechoslovak market an EC 1011 computer was ceremoniously turned over for use to the Institute of Philosophy and Sociology of the Czechoslovak Academy of Sciences in Prague and, subsequently, a meeting of organizations that over the course of years have cooperated with the Videoton company on our market was staged. The meeting was participated in by leading representatives of Videoton, foreign

trade organizations and other organizations from political, scientific and economic walks of life. Videoton representatives expressed their appreciation for the 10 years of cooperation with partner organizations of the National Organization for Technical Services in the Office Machines fiduciary concern organization and Datasystem, f.c.o., which to a great extent shared in Videoton's successes on the Czechoslovak market.

ZETO-Lodz

Prague VYBER INFORMACI Z ORGANIZACNI A VYPOCETNI TECHNIKY in Czech No 4, 1983 pp 544-546

[Text] ZETO [Zaklad Elektronicznej Techniki Obliczeniowej--Institute of Electronic Computer Technology] is a group of more than 40 computer centers located all over Poland, the mission of which is routine data processing, but also consultation services and the training of specialized cadres. The role of ZETO centers has changed considerably since the first center of this kind was established in Warsaw. The first ZETO center served as a territorial institution for larger national enterprises and organizations to prepare them for future selection and procurement of a computer. Now, at the end of the second decade of ZETO development, the centers can boast of having introduced several nationwide systems, or that their activity in the introduction of software under license is generally recognized.

Lodz 1966-1983

In the "Polish Manchester" region, as Lodz is often called because of its developed textile production, ZETO has been working since autumn of 1966. This center initially occupied a less important position among other centers, but in 1980 it was awarded the Victorious Banner of Trade Unions, which it retained permanently. It operates with ODRA 1304 and 1305 as well as EC 1022 and EC 1032 computers. The "old" center at 69 Hutora Street was turned into a training center while the new building at 136 Narutowicza Street was made to accommodate all machinery, including the newly acquired M 4030 computer and the center's 200 personnel. In addition, "small local branches" were established in Skierniewice and Radom. Up to now the ZETO center in Lodz has sold its systemic products, their number exceeding 30, to more than 100 organizations. In addition, other centers belonging to the ZETO group turned out more than 50 other systems. In 1982 the turnover in software products exceeded 100 million zlotys. There exist various structural specializations that are dynamically developed under the team-leader system. More than 70 experienced programmers, system analysts and designers work within ZETO.

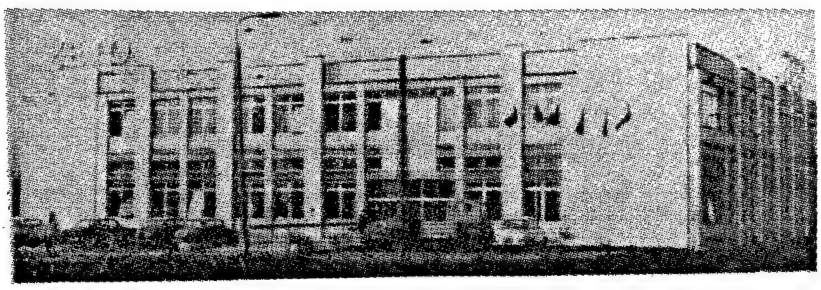

Fig. 1

ZETO Lodz Software Centers

The center has developed approximately 200 various software systems. Two that have gained international recognition are cited as an example. The program packet ZETOFLOW helps programmers working in COBOL or FORTRAN in proposing new developmental diagrams. It was introduced in more than 70 national computer centers, not including export agreements with Hungary and GDR.

The second system is the program packet ZETOTEST for the generation of tuning data, which offers substantial aid to system planners and team leaders in the generation of testing sets for checking programs. Such testing sets can be generated even before the proposed program is ready for operation.

New hopes are also put on the youngest ZETO systems, such as, e.g., ITEM and MIPL (see table). They are oriented primarily toward machines compatible with the IBM 370 computer series. The ITEM set helps users of interactive systems in compiling a working library for display units. MIPL is intended more for specialists and is designed for the emulative function of a given microprocessor on an existing medium-size standard computer--as a tool for program tuning. Characteristics of three systems turned out by the ZETO organization are used as an example to provide more detailed information, and some additional information about software products will be published at this year's Poznan Fair.

Item	ITEM	MIPL	ZETOTEST
Computer type	JSEP IBM	JSEP IBM	ODRA ICL
Memory	min. 512 KB	min. 512 KB	32 K words
Operating system	OS/MULTITASK	OS/DOS	GEORGE-2
Oper. methods	TCAM/BTAM	TCAM/BTAM	
Options	TSO	MTP-RODAN	
Aids	HELP	PL/M-80	
Application	design of display contents	microprocessor-cross-assembler simulator	generation of testing data
Mode	Interactive	Interactive	Batch
Number of users		3	19
Project	groups for numer. methods	groups for numer. methods	group for software
Team leader	R.M. Walewski	A.J. Grandys	Z.K. Dabrowski
Technical documentation	Is available	Is available	Is available

ITEM (1) System Applications

The user himself can switch to one of four key modes:

--control,
--copying,
--display readout,
--supplementing,

whereby in each mode he has full possibility for call-up of the HELP module.

MIPL (2):

The system offers full control of MCY-7880/INTEL-8080 programs processed in cross-compiler in five phases:

--editing of source program,
--tape perforation,
--decompiling,
--compiling,
--editing.

ZETOTEST (3):

The system generates in one run up to 10 tape sets with easily legible control lists and compiling test protocols which include:

--practical accuracy (correctness) in typical cases,
--search for special sequential progresses in atypical critical states,
--accelerated repetition of testing of application programs packet.

Plans and Objectives of ZETO Organization

Under the pressure of economic factors the ZETO organization achieved a certain degree of financial independence. As a result, the ZETO center in Lodz is carrying out an extensive restructuring of its assortment plan. This includes setting up new teams for the generation of software, and the key areas for software-systems are:

--statistical analysis,
--engineering calculations,
--programming of microprocessors,
--business systems,
--means for generation of software,
--optimization methods.

Along with the development of software, the ZETO center in Lodz is devoting attention to the training and education of specialists. It offers a methodologically designed educational and training program CSI (Central School for Informatics) with a capacity of 1,500 participants annually. In the school year 1983-84 the arrival of students from developing countries is expected as well.

ZAKLAD ELEKTRONICZNEJ TECHNIKI OBLICZENIOWEJ
Przedsiebiorstwo Panstwowe,
136 Narutowicza Street, telephone 829-13, 90-146 Lodz

Material Economy in Computer Centers

Prague VYBER INFORMACI Z ORGANIZACNI A VYPOCETNI TECHNIKY in Czech No 5, 1983 pp 591-593

[Text] Economic Utilization of Materials in Computer Technology

The problems of efficient management of materials stand in the forefront of interest today not only in production. Computer technology is also a large consumer of some important materials. These involve, e.g., paper for printout of processing results and carbon paper, magnetic tapes, cassettes and disks, as well as special color ribbons. The production of most of these materials calls for imported raw materials. Some of these materials are not produced in our country at all, so that the entire demand must be met by imports.

Among the problems attendant to imports should be pointed out primarily raw materials for the production of carbon and, further, the importation of all magnetic media. Paper production is also tied to imports, even though indirectly. Existing production capacities, even when operating at maximum load, are unable to meet current demand. Production equipment can be procured exclusively from imports, causing feedback to become a factor. Color ribbons depend on the production of a special fabric which, while it is of domestic production, is not available in the required quantity.

At the same time, the number of installed computers is constantly increasing, as is demand for the volume of the turned-out computation results. This leads to an increasing lack of harmony between the demand on materials for computer technology and the potential for meeting it.

It is imperative that the situation be dealt with by central economic authorities in order gradually to resolve and eliminate this constantly increasing imbalance. The Czechoslovak Scientific and Technological Society also wants to contribute to the alleviation of this extremely grave situation. Its Central Bohemia Kraj Committee for Scientific Management therefore decided to organize on 20 October 1982 in the Central Club of Transportation and Railroads in Prague a workshop on "Problems Relating to Basic and Auxiliary Materials for Computer Centers."

The workshop dealt with three thematic areas, specifically the supplying of

--paper and printed forms for computer technology,
--magnetic media and maintenance of their quality,
--color ribbons.

Individual topics were dealt with by leading personnel from the relevant marketing organizations.

--Production and services provided by the Commercial Printing Plants in Kolin were reported on by Eng V. Hoffmann;

--a supplementary report was presented by Eng M. Flajshans from the Marketing Association of the Paper Industry;

--deliveries and services offered by the Film Laboratories in Prague formed the contents of a report presented by the chairman of the Committee for Scientific Management;

--information on the production and procurement of color ribbons for computer technology was provided by Comrade Zabal, head of operations in the production cooperative Druchema, Plant 20.

The largest producer of color ribbons, the Koh-i-noor enterprise, did not show interest in participating in the workshop and did not answer an invitation.

With regard to paper and forms for computer technology, as pointed out by Comrade Eng Hoffmann, the technological maximum of their production has already been reached. Yet, there is unmet demand that exceeds the cited maximum by some 3,000 tons. At the same time, production capacities are 10-15 years old. While the importation of additional production systems (special printing machines), envisioned for 1983, will translate into an approximately 10 percent increase in production capacities, it will not eliminate this disparity. The increased capacity will be used first of all to meet the demand for paper for newly installed computers and, in part, for marketing through the relevant marketing organization (OSPAPU [Marketing Association of the Paper Industry]). Additional increases in production can materialize only after the acquisition of foreign exchange coverage for additional machinery.

Problems with providing paper became aggravated through the importation of the so-called desktop computers with affordable prices that call for perforated paper. However, in view of the existing methodology for planning production capacities, its importation obviously was not taken into consideration.

The follow-up report of Comrade Eng Flajshans of OSPAPU suitably supplemented the outline provided by the representative of the Kolin Business Printing Plants. It pointed out that today some new products are available, e.g., a chemical that directly copies paper (without carbon), which, however, calls for foreign exchange coverage. Potential substitutions or needs must obviously be judged in this area very strictly from the viewpoint of maximum economy. On the other hand, the demand for punch cards and perforated tape is met by domestic capacities, and future outlooks show no potential change. Marketing organizations in the SSR are Slovpap and the Bratislava West Slovak Printing Plants. Nevertheless, both of the preceding reports dealt exclusively with the state in the CSR.

Deliveries and services provided by the Film Laboratories--which provide magnetic media and some accessories--must also be based on the fact that all of these materials call for foreign exchange coverage, mainly from socialist and, in absolutely urgent cases, even from capitalist countries. Here the fact that

imports from socialist countries are accessible to domestic consumers only in domestic currency is not of decisive relevance.

The Film Laboratories supply mainly ORWO magnetic tapes, types 415 (up to 800 bpi bit density) and 425 (up to 1,600 bpi or 3,200 fci). Approximately 180,000 reels of the first type have been distributed already. Prior to delivery to domestic consumers all tapes are subjected to 100 percent control testing. Details regarding technical specifications, controls and type of delivery are listed in technical and claim conditions for delivery that can be obtained from the Film Laboratories' business department. Similar claims conditions were also issued for disk sets EC 5053 and EC 5261 as well as for the EC 5269 diskettes starting in 1982.

The film Laboratories also supply the so-called reference tapes that are used for adjusting the skew of magnetic heads and recording amplitude. The precision of their recording is retained for 2 to 3 years, after which they require retesting and restoration or, eventually, replacement.

An assortment similar to that of tapes is provided for magnetic disks, cassettes, diskettes and auxiliary materials (e.g., reflexive tape, etc.).

Particularly worth mentioning is the fact that Film Laboratories also provide services for care of magnetic tapes and disks, specifically:

--dry cleaning of magnetic tape at	Kcs 28.00 per unit
--dry cleaning and testing of magnetic tape	Kcs 79.50 per unit
--cleaning of magnetic disks	Kcs 13.50 per unit
--cleaning and testing of magnetic tape	Kcs 19.50 per unit

However, many assortments among magnetic disks, cassettes, etc., call for foreign exchange coverage, usually in dollars.

The representative of Druchema, Comrade Zabal, familiarized the participants with the production assortment supplied exclusively through the Office Machines fiduciary concern organization and the problems attendant to its production. The demand exceeds the production capacity of Druchema by 100 percent, the limitation being due not to production capacity, but to availability of materials. Only 155,000 bm of the produced fabric--designated Ugas in production--will be available in long-term outlook. Dyes also have to be imported from capitalist countries. Druchema makes its own spooling and winding machines. Shortages apply also to sheet metals needed for the production of spools for high-speed printers.

The importation of new types of high-speed printers with new types of wind-up spools brings about a higher demand on sheet metal, fabric and dyes, all of which cause difficulties.

The workshop was concluded by a lively discussion which evinced interest in the introduction of repair services for magnetic disk sets. In the discussion the participants agreed that:

--there is a need for maximum economy in producing sets, not printing them in large volume and systematically checking their utilization by users. Little used sets should be combined with others or discontinued;

--it is imperative to treat all magnetic media in the prescribed manner, to provide for their regular cleaning and testing and to adhere to the prescribed conditions for their storage in files;

--there is also need for careful storage of color ribbons to preclude their drying out before using and checking their condition during operation;

--in maintaining the requisite economy in the utilization of all of these materials, the primary need is for the responsible economic organs in both ministries of industry and in other institutions to eliminate the still increasing imbalance between production and consumption and attack the problem directly at the roots of its origin.

The workshop was participated in by 60 persons from 53 enterprises in the Central Bohemia Kraj.

Robotron Multicomputer Systems

Prague VYBER INFORMACI Z ORGANIZACNI A VYPOCETNI TECHNIKY in Czech No 5, 1983 pp 624-630

[Article by Eng Siegfried Baumann, Robotron combine: "Multicomputer Systems From Robotron"]

[Text] New areas of application with increased demands on electronic data processing are springing up in the course of the rapid development of technological, scientific and economic processes. Such demands involve, e.g.:

--the use of large centralized information sets for processing of extensive tasks,

--the implementation of processes based on division of labor that can be further divided according to territories,

--requirements on very high applicability of the overall system for the functional implementation of processes.

Robotron has developed systemic solutions to that end. It offers in particular multicomputer systems that are based on the following computer combinations:

--JSEP [Uniform System of Electronic Computers] computer with JSEP computers,

--JSEP computer with computers of the SMEP [System of Small Electronic Computers] series.

The level of multicomputer systems is determined by hardware instrumentation and software support. The hardware-oriented prerequisites of ROBOTRON EC 1055/ EC 1055.M computers for the establishment of multicomputer systems are:

1. For local multicomputer systems:

--control by direct signal,
--channel-to-channel adapter,
--instrumental control units with a two-channel selector or with two-channel connection.

2. For multicomputer systems installed separately from the computer:

--systems for remote data processing.

These possibilities can be used either individually or in parallel. Support for these instrumentation systems for coupling computers is provided by the OS/ES operating system as well as by additive software components.

Robotron has been supplying the EC 1055 computers to the CSSR since late 1980 and the EC 1055.M computers since 1983.

By way of introduction, it is essential to point out some of the key features of the EC 2655.M central unit:

--low demand on space--only 2 boxes,
--large capacity of main memory--maximum up to 4 M bytes,
--use of 16 K bit RAM memory units,
--low power input--approximately 4 kVA,
--use of microprogram memory on the basis of semiconductors with a capacity of 10 K instructions (1 instruction = 66 bits),
--possibility for direct connection of a special processor (matrix module) for extremely high speeds of computation operations,
--use of the new EC 7069.M control and servicing processor,
--power feed without main transformer by using network switching components,
--high reliability.

In order to make better use of the high performance of the EC 2655.M central unit, great significance is attached to the configuration of the model and its expansion. After the introduction of the 100 M byte exchangeable disk the model will be expanded in the foreseeable future by a magnetic tape with 800 and 1,600 bpi. Thus, with the EC 7039 printer and the EC 5075 floppy disk input and output system from the CSSR there are available additional modern instruments.

There does not appear to be any need for perforated tape among customers. For that reason the Robotron combine is offering the EC 7902.M station, which also affords the possibility of magnetic tape reading and recording. The EC 7907 desktop drafting instrument "DIGIGRAF" from CSSR and the EC 7053 drum-type drafting instrument for the USSR find application in processing of data in design. The EC 7920 display system is available in local and long-distance variant to facilitate direct communication.

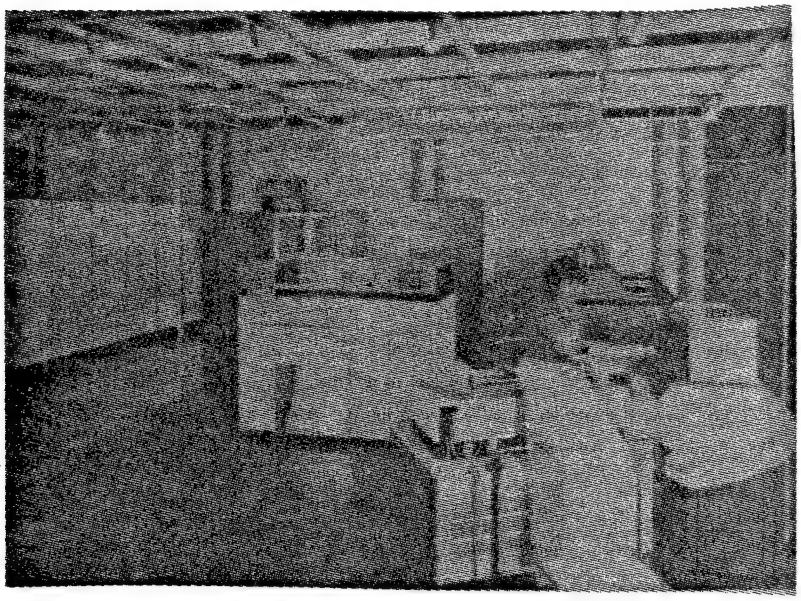

Fig. 1

Connection Variants for Local Multicomputer Systems
Available Hardware for Setting Up Local Multicomputer Systems

Control by direct signal is a system that facilitates the transmission of a data byte between two central units without use of the channel system. Due to its low transmission capacity it serves for the exchange of control information and is of significance to the users only in connection with other systems for the purpose of computer coupling. Most systems of the JSEP series 1 and 2 have direct signal control. Maximum length of cable between interconnected central units is 60 m.

The channel-to-channel adapter (KKA) is designed for exchanging larger amounts of data between two central units by means of channels. Thus, the exchange of data by means of KKA can be implemented between computers of the JSEP 2 series as well as between computers of JSEP series 2 and 1. Transmission speed is always determined by the slower channel and can be maximally:

--1.65 M bits/s during 1-bit transmission,
--3.30 M bits/s during 2-bit transmission.

The KKA thereby takes over the function of the unit for the control of instruments. It synchronizes data transmission between channels.

The EC 1055/EC 1055.M use the EC 4065 KKA. This KKA as an additive system is an integrated part of the central unit. However, it can be built in at a later date. Maximum length of cable between connected central units is 60 m. Local connections of computers with KKA and direct signal control have been implemented so far with the following computers:

--between two EC 1055/EC 1055.M computers,
--EC 1055/EC 1055.M with the EC 1040 computer.

These computer connections provide high-quality and long-term application of a computer system as the prerequisite for the technical computational processing of tasks that call for an extremely high level of systemic processing. In addition, high-speed exchange of data between computers is facilitated by the KKA. Easier organization of work in devising a local multicomputer system is achieved by simplification of the technological conditions in the computer center, resulting in manpower savings in comparison with computers installed separately.

The generation, maintenance and utilization of extensive data banks is facilitated by jointly used external memories. The simplest form of computer coupling is connection via the control unit of memory with direct access and magnetic tape memory with a two-channel selector. This two-channel selector connects the requisite unit for instrument control to two central units. This makes it possible for two central units to have access to the same systems and, consequently, to the very same data.

At the present time the two-channel selectors can be used to connect the EC 1055/EC 1055.M computers with the following units:

--magnetic tape systems: EC 5517/EC 5017-02, EC 5525.03/EC 5002.03,
--disk memories: EC 5561/EC 5061, EC 5568/EC 5061, EC5567/5667/EC 5067-02, and EC 5566/EC 5066.

In accordance with the norm, the maximum length of cables between central units and memory control units is 60 m.

One exception should be pointed out in this context: in connecting the control system of the EC 5567 large-capacity memory to channel BLMPX EC 1055/EC 1055.M the length of the cable must not exceed 45 m.

In addition to the interconnection of Robotron EC 1055/EC 1055.M computers by means of jointly used external memories and connections with the EC 1040 computers, tests were also made on connection with the 1035 computer.

Use of Terminal by Two Central Units

Since the EC 8404.M control unit for long-distance data processing uses a two-channel connection, separately installed terminals can also be used in redundant systems, e.g., from the production program "Decentralized Data Technology" of the Robotron enterprise or the EC 7920.M display system (long-distance variant) by two computers.

Software Support for Local Multicomputer Systems

Machine system support--component MMS. The MMS component is contained in the OS/ES 6.1 operating system. It supports control by long-distance signal, and supports the KKA and joint utilization of multichannel control devices. MMS

has the character of basic support for local multicomputer systems and can be used in corresponding user programs. From the functional viewpoint this component makes it possible to organize the exchange of data between problem-oriented programs in interconnected systems. MMS is an integral part of the OS/ES 6.1 operating system.

Asymmetrical multiple computer control system AMC. The AMC system represents a program component for local multicomputer systems oriented toward processing sets of programs. It operates on the principle of the master and slave (operational) computer. Subordinate computers are radially connected with the control computer via KKA. The AMC thereby supports up to eight interconnected computers. However, in one channel version of the EC 1055/EC 1055.M with one bit and four blocking multiplex channels, only up to five computers can be connected to one control computer (one connection per blocking multiplex channel and only one built-in KKA for one computer). Each computer uses its own operating system. Thereby the AMC component in the control computer performs:

--monitoring of subordinate (operational) computers,
--synchronization of data exchange with operational (subordinate) computers,
--systemic input and output in the control computer,
--internal assignment of tasks (jobs) from libraries,
--input and output of tasks (jobs) via fixed sentence length system of the key computer,
--input and output of tasks (jobs) from remote terminals and JSEP central units,
--control of a front of jobs, common to all computers, with data form optimized from the viewpoint of desired output,
--effective planning of jobs and sources by means of substantial AMC optimization algorithms.

Central operation of the multicomputer system occurs through the exchange of information and control instructions via the KKA.

The following supplementary AMC functions considerably increase the performance of multicomputer systems:

--preassembly of data transmission,
--control of networks of jobs (tasks),
--planning of final deadline,
--dynamic service programs,
--AMC specific diagnosis of errors,
--AMC flexibility thanks to repeated initiation without introduction of the initial program.

MAINTASK partial components from AMC must be installed in subordinate computers to facilitate cooperation between the master computer and slave computers. Use of AMC is possible only as an alternative to the generation of MMS in the OC/ES operating system. AMC is an a priori prepared (worked out) user solution which cooperates with the operating system as components C 15.

Use of the AMC component offers the following advantages and results:

--balanced computer load and optimum use of systemic resources,

—high performance of computer in a multicomputer system. Improved running time of programs brings about an increase in output on the order of 2.3 as compared to individual computers.

Testing programs. A whole series of comprehensive test models and DMES sections is available for functional testing by interconnecting computers through direct signal control, through the KKA and multichannel units for control of instruments. Furthermore, each central unit offers the opportunity for operating with DMES and OLT sections as well as MIDAS, which are available for any given instrumental chain (chain of instruments).

Devising Multicomputer Systems With JSEP Computers Installed at Remote Points

The connection of two computers via a system for long-distance data processing calls for the following prerequisites:

—each computer must be equipped with a control unit (multiplex) for remote data processing,

--corresponding transmission paths with the MODEM system or a system for short-distance data transmission must be available,

—operating systems with components for long-distance data processing must be generated in each computer,

--each computer must have active user programs for transmission or reception and/or for inputs or outputs.

Transmission speed depends on transmission paths and the long-distance transmission system.

The following long-distance connections were implemented between large computers:

—EC 1040 with EC 1040 computers,
--EC 1040 with EC 1055 computers.

In so doing, the computers were equipped with the EC 8404 MPD 4 multiplex. Use was made of MODEMS TAM 601--EC 8006. In both computers the OS/ES 6.1 operating system was generated by BTAM. In both cases a program called TPPROGM operates as a user program which also controls the exchange of control information. Exchange of information occurs regularly between Karl Marx Stadt and Dresden.

Multicomputer Systems With JSEP and SKR Computers Installed at Remote Points

As the result of the continued development of instrumental technology in Robotron by the introduction of microprocessors, modern electronic modular

assemblies and individual compact systems assembled in modular form, high-performance functional elements are available now and will be in the future. They will find application in the control of long-distance data transmission and as applicational complexes, suitable for both autonomous and "on-line" modes, with long-distance connections to JSEP computers.

Among others, the following systems are available for long-distance interconnection of computers and for data transmission control:

--EC 8404.M control unit for long-distance data transmission for controlling a maximum of 128 transmission lines, either asynchronous or synchronous. It uses a two-channel connection and operates at transmission speeds from 50 to 9,600 and 48,000 bits/s. Maximum transmission speed is approximately 50 K bits/s;

--Robotron K 8523 multiplex as a compact unit that can be built in for control of a maximum of 16 decentralized lines and assembly of these data flows for a superior terminal system in unattended operation. It operates at transmission speeds from 50 to 9,600 bits/s. Maximum transmission speed is approximately 5 K bits/s;

--MODEMS modulation and demodulation instruments are systems for low-voltage data transmission to distances up to 30 km;

--IFS interface for serial radial connection for interconnecting instruments at a maximum distance of 500 m;

--PCM 10-400/800 directional radio communication system. This system replaces the traditional long-distance data transmission along telephone lines.

Up to 10 information channels with a maximum transmission speed of 64 K bits/s are made available. Here a single information channel corresponds to a two- or four-wire line. Among others, the following computers are available as applicational complexes for long-distance interconnection:

--Robotron A 6401 and 6402--EC 8551 commercial basic computer system.

Both computers can find general application for scientific, technological and economic purposes. They are characterized by the great variability in configuration met by the offered software and are capable of working both "off-line" and "on-line." Connection is provided via the Robotron K 8523 multiplex, which is connected to the computer's busbar. The multiplex 24 V connection facilitates interconnection with a large computer via the control unit for remote data processing.

--This basic computer system serves as a basis for the operation of the Robotron A 6422 data acquisition and information system. This system makes available a modern product that can be used for data acquisition in computer centers as well as for operational data acquisition in production. It performs the functions of data acquisition, processing and information in a dialogue man-computer,

--in addition, Robotron offers Robotron A 6491/A 6492 processing computer systems. They are designed for use in automated production control, automation of test laboratories and in other areas for the solution of tasks in real time and for process-connected operation.

Long-distance Interconnection of the Small CM4-20 Computer With Robotron Computers

The CM 4-20 can be connected in the same way as interconnection between the EC 1055/EC 1055.M computers and basic computer systems. Asynchronous test connection was successfully accomplished at a test field in Dresden. The following chain of instruments was used in the test: EC 1055, EC 8404 (MPD4), MODEM EC 8006 (TAM 601), typical permanent telephone line, MODEM EC 8006 (MDS 1200), CM 4-20.

Software support was provided:

--in EC 1055 by the OS/ES 6.1 M.4 operating system with BTAM with AP 62/64--standard program;

--in CM 4-20 by the DOS RV V2 operating system. A user program, adapted to the test, was worked out for the CM 4-20 by means of a data system. After this successful asynchronous test a synchronous test was made in Bratislava. The complex of systems used for the latter purpose consisted of the EC 1040, MPD 4 (EC 8404), MODEM, a permanently connected line, MODEM and CM 4-20.

Software for Transmission of Information Between Distant Computers

Software for the EC 1055/EC 1055.M computer. Available at present is the OS/ES 6.1 operating system, modification 8, which includes:

--basic DFV method BTAM,
--expanded DFV method TCAM,
--the CRJE dialogue input system,
--time sharing option (TSO) components.

Software for the EC 8404.M control unit for remote data processing. For this unit there is special machine-oriented systemic documentation which replaces the MPD4 (EC 8404) multiplex. This provides for the performance of the following functions:

--function mediation, such as line and path control;

--additive functions, such as transmission control, computer connection and information processing;

--administrative functions, such as control of regulation, control of interruption, organization and balancing of memory and a standard control program;

--systemic functions, such as statistics, processing of errors and logic connections.

This control system comes with the BTMA or TCAM operational systemic components for input from the EC 1055.M electronic data processing system into the control unit for remote data processing.

Software for basic computer systems. For these computer systems the MOOS 1600 operating system is available. In addition to the MOEX control program, translation and service programs that belong to the operating system, the following systemic documentation is useful for remote data processing:

--"message control,"
--"remote processing in batches."

The control program for Multiplex K 8523 is a part of the instrumentation. Functional capability for interconnecting computers is tested by test programs that run in a JSEP computer as well as the computer interconnected at long distance.

Computers in KamAZ

Prague VYBER INFORMACI Z ORGANIZACNI A VYPOCETNI TECHNIKY in Czech No 5, 1983 p 638

[Article by A. Halek: "Computer Systems in the Soviet KamAZ Combine"]

[Text] The Soviet automobile production enterprise KamAZ is automated by means of an integrated multilevel control system (ASU-KamAZ). It has the following computers installed: EC 1045, EC 1055, EC 1055M and EC 1040. In addition, some production and storage operations use mini- and microcomputers which are hierarchically tied into larger systems of central computers in ASRP [Automated Systems for Enterprise Management] arrangements. The acquisition of primary data from operations is handled by the 350-unit Ri-7501 systems which operate in autonomous mode. The ASRP arrangement for production assembly lines uses the SM-2 twin processor minicomputers with DM-2000 display units with keyboards.

The high economic effectiveness of using computer technology is borne out by, e.g., the operation of ASRTP [automated system for control of technological processes] with a doubled SM-2 minicomputer in KamAZ foundry operations, where it helped to reduce the consumption of electrical energy by 8 percent, shorten the production cycle by 8.4 percent, cut down on technological idle time by 1.8 percent, decrease consumption of auxiliary raw materials by 3.1 percent, increase production volume by 0.8 percent and reduce production of rejects by 24.4 percent. The foundry operation alone achieves annual economic savings on the order of R 800,000. ASRTP models of selected production processes from operational and storage facilities were demonstrated at the specialized international exposition "Avtomatizatsiya-83" in Moscow in June of 1983.

USSR Data Processing

Prague VYBER INFORMACI Z ORGANIZACNI A VYPOCETNI TECHNIKY in Czech No 5, 1983 p 638

[Text] Remote data processing in the Soviet Union keeps rapidly expanding, particularly in the all-union computer network VSKP (Vychislityelnye Sistemi Kollektivnogo Polzovaniya), under the jurisdiction of the USSR All-Union Bureau of Statistics. The key hardware are subscriber stations AP-4 (EC 8504) which include: EC 7172 Czechoslovak electric typewriter, EC 6121 Czechoslovak photoelectric tape reader, EC 7122 or EC 7123 tape perforator, EC 6112 card reader, stepping magnetic tape. Long-distance transmission is done via telephone network at speeds up to 1,200 or 2,400 bits/s. Key display means are sets of the EC 7920 alphanumeric displays that come in four varying systemic arrangements. The first completed sector of the computer network is now in experimental operation in the Estonian SSR.

Soviet Multiprocessor Measuring System

Prague VYBER INFORMACI Z ORGANIZACNI A VYPOCETNI TECHNIKY in Czech No 5, 1983 p 638

[Text] A new Soviet multiprocessor system for measurements was formed by means of uniform functional connecting units produced in accordance with the MEK standard. Two Elektronika-60 microcomputers and one Elektronika 100/25 microcomputer are used for parallel computer operation. Their common LDO-LD7 all-purpose type busbar and a data multiplex automate operational analysis of a great number of measured values. The developed multiprocessor systems will be installed in production operations turning out electronic passive and active elements.

Computer Bibliography

Prague VYBER INFORMACI Z ORGANIZACNI A VYPOCETNI TECHNIKY in Czech No 5, 1983 pp 639-640

[Book reviews by A. Halek]

[Text] Aven, O.I., Gurin, N.N. and Ya. A. Kogan, "Otsenka kachestva i optimalizatsiya vychislitelnych sistem" [Assessment of the Quality and Optimization of Computer Systems]. Nauka, Moscow 1982, 464 pp, 93 ill., 72 tables, price R 3.30.

The authors are outstanding Soviet experts in the described field. The introductory chapters deal in detail with modeling methods for computer systems, their devising and practical application. Markovian models and diffusion approximation are dealt with in detail. Great attention is focused on the analysis and tuning of programs with operating systems for JSEP 2 [Uniform System of Electronic Computers, series 2] computers, the OS EC operating systems. The EC 1022 computer system was most widely used in verification. In the conclusion the book lists 234 literary sources applying to the most significant worldwide problems in this field. The publication is available from the

Scientific and Technical Library of the House of Soviet Science and Culture in Prague under No 681.3/A-19-121-83.

Bushev, S.N. and M.S. Besfamilnyy, "Programno-apparatnye metody opravleniya dannymi" [Programming Methods for Data Control]. Nauka, Moscow 1982, 28 ill., 18 tables, price 85 kopeks.

The publication's contents introduce the structure of JSEP 1 and 2 computer systems, their properties and systemic arrangements. It describes central processors and means for input/output programming. Control programs and basics of the OS EC operating systems are analyzed in close detail. Multiprogramming is discussed in detail in the area of control programs. The publication deals with the peculiarities of peripheral units in various JSEP arrangements, organization of data inputs/outputs processing and mass data processing from the viewpoint of the possibilities provided by the JSEP 1 and 2 series computer systems. The book is available from the Scientific and Technical Library of the House of Soviet Science and Culture in Prague under No 681.3/B-94-136-83.

Borisevich, V.F., "Sistema razdeleniya vremeni EC EVM" [Time-Sharing System for JSEP Computers]. Finansy i statistika, Moscow 1982, 240 pp, 24 ill., 7 tables, price R 1.10.

The opening of the book explains the basics of time sharing in JSEP computer systems, deals with OS EC operating systems and defines the principles of optimum programming. Detailed discussion is offered of the significance and mission of instructions with the objective of devising suitable software with a view to time sharing. It also describes display terminals suitable for dialogue between user and computer. The book is registered in the Scientific and Technical Library of the House of Soviet Science and Technology in Prague under No 681.3/C-40-348-83.

Kalyaev, A.V., "Mnogoprotsessornye sistemy s programiruemoy arkhitekturoy" [Multiprocessor Systems With Program Architecture]. Radio i svyaz, Moscow 1984, 320 pp, 67 ill., 21 tables, price R 2.10.

The author is a professor and scientist at the Institute of Radio Engineering in Tagansk--he is an outstanding Soviet specialist in cybernetics and computer technology. In the publication he presents a new concept for the design of multiprocessor systems based on the use of all-purpose communication structures. This provides for widely based programming of direct transmission channels between microprocessor systems and blocks of memories. This original concept provides for higher speed and improved flexibility of ongoing calculations, which is also promoted by simple structuring of program generation.

Sorokin, G.P., et al., "Elektronnaya vychislitelnaya mashina EC 1033" [The EC 1033 Electronic Computer]. Mashinostrenie, Moscow 1982, 170 ill., 48 tables, 11 appendices, price R 1.60.

The authors are R&D specialists who have dealt with the hardware and software of the EC 1033 computer system. They describe in detail the basic properties and the requisite peripheral units, their characteristics and limitations.

Great attention is devoted to design and to original microelectronic circuits (stating, e.g., that two original inventions--patents No 486,376 and 624,295--were used to improve the function of memory storage). Here are published for the first time data about the microprogram control of the EC 1033 computer and the built-in automatic diagnostic devices and the relevant testing programs. Main attention is focused on software, its potential applications, etc. The book is registered in the Scientific and Technical Library of the House of Soviet Science and Culture in Prague under No 681.3/E-45-373-83.

Khromov, V.I. and S.A. Ul'yanov, "Vvedenie v programmirovanie dlya sistem teleobrabotki danykh" [Introduction to Programming of Remote Data Processing Systems]. Finansy i statistika, Moscow 1982, 176 pp, 34 ill., 32 tables, price 65 kopeks.

In the introduction this publication explains the basics of remote data processing the structure and arrangement of inputs/outputs of EC JSEP computer systems. It analyzes in detail three basic methods for the OS EC JSEP operating systems: Method EXCP, BTMD (Bazisnyy telekommunikatsionnyy metod dostupa [Basic Telecommunication Access Method]) and OTMD (Obshchaya telekommunikatsionnaya methoda dostupa [General Telecommunication Access Method]). Peripheral equipment is constituted by the EC 7920 alphanumeric display tubes. An appendix shows in tabular form the DKOI codes used for long-distance transmission and mass data processing. The publication is available from the Scientific and Technical Library of the House of Soviet Science and Culture in Prague under No 681.3/X-94-244-83.

New Computer Hardware

Prague VYBER INFORMACI Z ORGANIZACNI A VYPOCETNI TECHNIKY in Czech No 5, 1983 pp 695-697

[Article by A. Halek: "New Computer Hardware at the DNT '83 Exposition"]

[Text] The Days of New Technology'83, organized in June 1983 in Prague under the aegis of Tesla Research Institute of Communications Technology of A.S. Popov (VUST) and 45 industrial electronics centers, including the CSAV [Czechoslovak Academy of Sciences], SAV [Slovak Academy of Sciences] and SVAZARM [Association for Cooperation With the Army], introduced 143 new components, instruments and devices. In the field of computer technology there were 15 new exhibits:

An automated system for testing KY 0 302 000 printed circuit plates (TESLA VUT [Research Institute for Telecommunications], production TESLA Karlin). It is of modular assembly and is controlled by the ADT 4400 minicomputer which translates plate testing programs written in BASIC. All digital and analog measuring instruments are connected to the computer by means of the TMS-2 busbar. There is a maximum of 64 contact points per plate.

The PIP-4 programmable training computer (ZO [Intraplant organization] Svazarm Usti on the Elbe River). It is a didactic aid used in teaching microprocessor and computer techniques. The computer uses NMOS LSI memories and TTL SSI integrated circuits.

The DS 200 digital modular system (Elektronika Svazarm). It is used for teaching the basics of computer technology theory and practice. Basic functions are programmed by six changeover switches and their states are displayed by luminescent diodes. Its basic equipment includes a handbook, interconnecting conductors and 14 various types of integrated circuits.

The SMEP TEXT 01 office microcomputer (Research Institute of Computer Technology, Zilina, production ZAVT [Automation and Computer Technology Enterprises]). It is intended for the automation of administrative operations. Its hardware is based on the SM 50/40.1 microcomputer with an added keyboard and a disk unit with two flexible disks. Internal memory capacity is 64 KB. Production was launched in 1983 and the envisioned price is Kcs 250,000.

A system for mass urban transportation control by the DRAHUSA computer (Datasystem Bratislava and TESLA-VUST Prague). It provides automatic transmission of information about the position of transportation means in the urban traffic network, compares it with a timetable and informs drivers and dispatchers of any deviations. It provides drivers with instructions for departure from terminals. The system includes the DK 21 coder; it facilitates the automatic selection of a radio communication channel for dialogue between dispatcher and bus drivers. DRAHUSA has four built-in subsystems for: performance, control inspections of buses, time graphs and data for comprehensive traffic control. The system's capacity is 1,000 vehicles, the information renewal cycle is 6 minutes, using the SM 4-20 minicomputer. Production was launched in 1983 in Transportation Enterprises Bratislava, the anticipated cost is Kcs 7,500.

The TESLA SAPI-1 microprocessor system (TESLA Elstroj, production TESLA Liberec, supplier TESLA ELTOS D1Z, Prague). It is intended for all-purpose applications, is based on the JPR-1 microcomputer and has 24 inputs/outputs. The capacity of its EPROM memory is 1 to 16 KB, of RAM memory 1 to 40 KB. Data transmission speed from a cassette tape recorder is 240 characters per second. It is marked by high reliability--its mean time between failures is 2,500 hours. It is suited for control of machinery, measuring instrument systems, for the acquisition and preparation of data, for control centers and for teaching of programming. It has been available since 1983 and costs Kcs 50,000.

The specialized Design Automation System (VUMS [Research Institute for Mathematical Machines], production ZPA [Industrial Automation Enterprises] Cakovice). It provides for automation of repetitive mental, design and planning operations by means of computer technology. Its basic unit is the ADT 4500 or SMEP [System of Small Electronic Computers] minicomputer, supplemented by input/output units. Its production commenced in 1983 and the estimated price is Kcs 4 million.

The Consul 2112 (EC 8576) Communication Terminal (VUMS, production Zbrojovka Brno). It is portable, has an alphanumeric keyboard and a dot printer. It provides for synchronous and asynchronous data transmission in BSC or SDLC/HDLC mode up to 4,800 words per second. Its built-in buffer memory of 2 x 256 words can be edited. It is connected to an external modem for data transmission with a V 24/V 28 CCIT interface. Production will be launched in 1984 and the estimated price is Kcs 84,000.

The SARTF general program for data sorting (TESLA Pardubice). It is envisioned for use in computers equipped with a compiler for the language FORTRAN IV, which on the basis of dialogue with the operator generates a program for sorting a specific set of data depending on preference. The set contains a maximum of 32,000 sentences and 40 sorting criteria.

A microcomputer-aided temperature controller (Research Institute of Electrotechnical Engineering Bechovice). It is formed by three units: a power supply unit, converter and microcomputer. It cyclically assesses key data and the momentary state of the control circuit is displayed optically. It uses the I 8008 microprocessor. The adjustable value of both temperatures is 999°C, maximum temperature deviation is 2°C. It can alternately control two thermal systems simultaneously.

The MDS-8085 microcomputer for the development of instrumentation for artificial satellites (TESLA-VUST). It is a developmental system for the design of microcomputers with 8085 and 8080 microprocessors. Its operation is autonomous or in connection with a teletype or a photoelectric perforated tape reader. Instructions in program tuning are fed in in machine code converted into decadic form. It has four interruption levels and 41 inputs/outputs.

The BM-583 logic analyzer (TESLA-VUST, production TESLA Brno). It is formed by two independent devices: a time and state analyzer which can operate as an 8-bit time analzyer or a 24-bit synchronous analzyer. In both cases 256 states can be stored in the memory. The device is intended for diagnosing the acquisition and display of digital information and their chronological progress is interpreted as progression of logic states of logic variables. Maximum sampling frequency is 10 megahertz, minimum width of interceptable interference pulse is 10 nanoseconds and pulse repetition frequency during asynchronous monitoring can be selected in a range of 2 hertz to 10 megahertz. The BM-583 analyzer is a necessary aid for the development of digital systems, particularly microprocessor-oriented systems. Production will commence in 1984 and the estimated price is Kcs 120,000.

Materials and fibers for optoelectronics. The PCS light-conducting fiber (Joint Laboratory for Chemistry and Technology of Silicates of the CSAV and of the Institute of Chemical Technology in Prague). The PCS fiber is intended primarily for transmissions involving numerically controlled machinery, for the connection of peripheral units to a computer and for the communication of signals from sensors and readers in areas with strong electromagnetic interference. Another light-conducting fiber produced by the MCVD method with polymer protection is designed for the transmission of data over short and medium distances within a constant temperature range of -55 to +350°C.

Hybrid integrated circuits for transmission and reception systems in optical communications (TESLA-VUST and URE [Institute of Radio Engineering and Electronics CSAV, Prague). They form the basic components for the transmission of data via light-conducting fibers. The input electric signal with TTL levels and transmission speeds from 0 to 10 MBaud is encoded into a code suitable for light-conducting cables. It offers the advantage of galvanic separation of input and output.

At the simultaneously progressing seminar with four sections, the following lectures were of interest from the viewpoint of computer technology:

--KPK-128 digital transmission system of the second order (TESLA-VUT, Prague),
--microprocessor applications in electronic metrology (TESLA-VUT, Prague),
--8048 integrated microcomputer (TESLA-VUST, Prague),
--pinpointing of defects in light-conducting cables (Communication Installation Enterprise, Prague),
--new approaches to control of digital autonomous servosystems with stepping electric motors (VUSE [Research Institute for High-Voltage Engineering], Bechovice),
--design of phase-corrected filters by small computers (TESLA-VUST, Prague).

Interested parties can order monographs from the seminar from the Czechoslovak Scientific and Technological Society Branch in VUST, Novodvorska Street 994 142 21 Prague 4-Branik.

The DNT'83 is a significant undertaking in the CSSR that annually introduces new electronic products and exhibits of new computer technology that are of interest to specialists in Czechoslovak computer systems and indicate future developmental outlooks.

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